ELECTRICAL WORLD

OCTOBER 29, 1932
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Engineering
OCT 31 19

THE TREND TODAY
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Your instrument costs are made up of three factors:—1. *Purchase Price.* 2. *Maintenance and repair.* 3. *The direct effect of the instrument's reliability on the device or process being controlled or tested.*

The first two are closely related. In Weston instruments' forty-four years of experience, a trained personnel unequalled for skill and the most advanced instrument production methods keep prices strictly competitive and performance at the recognized Weston high standard.

The last factor, the effect of the instrument's reliability on the device or process being controlled or tested, ofttimes is disregarded. Yet it is the most far reaching, the most important to the instrument buyer and user. Realizing this, Weston directs every effort to building reliability into every instrument. This begins with the design and the infinite care given the preparation and treatment of parts. Here are a few examples which enter into the construction of even the low price miniature Weston panel instruments:—

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EXTRA BUILT-IN VALUE in Weston Model 301

COIL FRAMES—insulated by a unique compound.

MAGNETS—made of highest quality magnet steel; specially melted to Weston specifications; complete magnetic study made of every melt; rigid laboratory control on forging, hardening and treating processes; pole pieces ground all over.

PUNCHED PARTS—requiring accuracy, go through a shaving operation perfecting parts to a fraction of a mil.

SPRINGS—of special bronze alloy melted in Weston's Metallurgical Department. Complete springs aged, selected and thoroughly checked to assure perfectly uniform operation.

RESISTANCE WIRE—temperature coefficient of all resistance wires used in Weston instruments held strictly under laboratory control and, along with specific resistance value, must come within rigorous tolerances.

SHUNTS—Manganin, used in shunts and resistors, made in Weston's Metallurgical Department, strictly to analysis. This alloy was first developed in Weston Laboratories. Its composition, melting procedure, mechanical working and heat treatment are all the result of many years' experience. Manganin is acknowledged as supreme to any material in which resistance values must be held constant.

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Features such as these build superior performances —*added* value into Weston instruments . . . *and keep your instrument costs down.*

The full significance of this statement is readily appreciated by the experienced instrument buyer.

WESTON

ELECTRICAL INSTRUMENT CORPORATION

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ELECTRICAL WORLD

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October 29, 1932

John Fritz Medal to Mining Engineer

HIGHEST of engineering honors, the John Fritz award, has been made for 1933 to Daniel C. Jackling of San Francisco for "notable industrial achievement in initiating mass production of copper from low-grade ores, through application of engineering principles." The award is made by a board of sixteen representatives of the four national societies of civil, mining and metallurgical, mechanical and electrical engineers, having an aggregate membership of more than 60,000.

Mr. Jackling is widely known in the mining industry for his pioneer work in extracting copper on a large scale from ore containing as little as 2 per cent of the metal, an achievement which has greatly added to the world's potential copper reserves.

"It is probable," the announcement states, "that at least half of the present-day production of copper may be considered as due directly or indirectly to the success of the low-grade properties, in the development of which he was unquestionably the pioneer. . . . "A large supply of copper at reasonable prices has been fundamental to the development of the electrical industry in all its phases—the generation, transmission and utilization of electric power and light, the telephone and the radio."

Mr. Jackling is the twenty-ninth engineer to receive the John Fritz gold medal, which is awarded not oftener than once a year "for notable scientific or industrial achievement, without restriction on account of age, nationality or sex." It is a memorial to John Fritz, Bethlehem engineer, who was long a leader in the American iron and steel industry, and who, in celebration of his eightieth birthday in 1902, was the first to receive the award.

Other medalists have included Herbert Hoover, Thomas Alva Edison, Guglielmo Marconi, Admiral David Watson Taylor, U.S.N.; Orville Wright, Elmer Ambrose Sperry, Lord Kelvin, John J. Carty, Ambrose Swasey, John Frank Stevens, J. Waldo Smith and M. I. Pupin.

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Insull Extradition Inactive; Receivers Report Progress

Apparently encouraged by the continued refusal of the Greek foreign office to proceed in accordance with the request of the U. S. Chargé d'Affaires in Athens asking his extradition under an unratified treaty, Samuel Insull is reported to be enjoying his stay in Greece as a tourist and sightseer.

Foreign Minister Basil Dendramis of Greece has stated that documents are en route ratifying the Greco-American treaty of extradition under which Samuel Insull's return is sought.

Action to obtain income tax refunds amounting to $33,013 and relief from deficiency assessments of $197,739 was taken before the Board of Tax Appeals last week by Samuel Insull Sr., Chicago utilities man; Samuel Insull Jr., his son, and Margaret A. Insull.

The federal government levied the deficiency assessments against the Insulls in August. The Commissioner of Internal Revenue contended that profits realized from the sale of stock in Insull Utility Investments, Inc., and the sale of rights to buy stock should be treated as ordinary income instead of capital gain on assets held more than two years. Attorney for the Insulls explained that the capital gains tax of 12½ per cent should have been applied instead of the higher income and surtax rates.

Returning from a trip through the Southwest, during which inspection was made of Insull properties now in receivership, Charles A. McCullough and Edward N. Hurley, receivers, reported properties to be in good condition. Write-offs, uniform depreciation charges, reduced administrative costs are among the objectives for which the receivers are working. "The operating subsidiaries," states the report, "are covering their interest and preferred dividends, though by varying margins."

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Maryland Contractors Oppose Utility Merchandising

Members of the Electrical Contractors' Association of Maryland have been asked to affirm a resolution indicating that "This association is unalterably opposed to all merchandising of sales, rentals, leases and installations of wiring, piping, motors and appliances, for operation by electricity, gas and/or steam by utilities operating within Maryland, and it hereby petitions the honorable members of the Legislature to enact at the earliest possible moment suitable legislation to effect the complete discontinuance of said merchandising activities not later than June 1, 1933."

The resolution cites alleged harm to various interests, including Maryland workers, manufacturers, sales outlets and consumers.

The Electrical Contractors' Association of Maryland also has asked the Maryland Public Service Commission what changes have been made in the uniform accounting systems of the electric and gas utilities properly to reflect their merchandising activities. The commission has notified the organization that no change has been made in the accounting classification.

Columbia Gas & Electric Hearings Are Begun

Dusty skeletons of deeds dead and gone a quarter of a century were dragged from their all-but-achieved oblivion when the Federal Trade Commission resumed its hearings of utility holding companies last week. Twenty-five years ago, according to Robert J. Ryder, the Columbia Gas & Electric Company, predecessor to the Columbia Gas & Electric Corporation of today, bought 10,000 shares of the stock of the Union Gas & Electric Company from an intermediary, acting for stockholders of Union Gas, for $37,000,000. Within a few months of that time the stock sold for approximately $10 a share and its highest price had been but $100 a share in the open market. A write-up of at least $36,000,000 was therefore made, according to Mr. Ryder.

Mr. Ryder further testified that in 1926, following the merger of the Ohio Fuel Corporation into Columbia Gas & Electric, the assets of the latter corporation were increased $179,961,293. Investments in affiliated companies were increased from 1926 to 1929 by approximately $50,000,000.

It was subsequently testified by Mr. Ryder that some of these increases in value might have come about through natural gas development, but that he had been unable to determine what the actual values had been in some instances.

High returns reported

That the Columbia Engineering & Management Corporation, owned by Columbia Gas & Electric, paid a dividend in 1928 of $2,250,000 on a capital investment of $1,216,000 was testified to by Mr. Ryder. Dividends by the same company on the same investment in 1929 and 1930 were $2,000,000 and $1,500,000 respectively, the records showed.

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Service Value Superior to Rate of Return

"If the rates charged by a utility represent the maximum reasonable value of the service to the consumer, they cannot be held, as a matter of law, unreasonable or confiscatory as to the company, whatever may be the result upon its returns," according to the Supreme Judicial Court of Maine.

This was held in the case of Gilbert E. Gay, et al., vs. Damariscotta-Newcastle Water Company when the court over-ruled exceptions to an order of the Public Utilities Commission denying an increase in water rates.

It was further held that "the public is entitled to demand that no more be exacted from it for the services of a public utility in the form of rates or charges than the services rendered are reasonably worth."

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Terminal Purchases Power; Reduces Costs 28 per Cent

After a year of service, during which purchased power replaced energy generated in a private plant, it is reported that the Terminal Railroad Association of St. Louis realized a power cost reduction (including steam services) of 28 per cent. Upon careful studies of private plant operation, supplying 8,460,000 kw.-hr. and 168,843,700 lb. of steam service in an average year at a cost of $225,859, it was decided to purchase power, but to continue to generate steam needed for various yard and station services.

Results in the actual operation for a full year show an expenditure of $164,542 for purchased power and steam plant operations, against $229,995 in the year preceding, or a saving of $65,453. This was accomplished in the face of increased steam usage. The Terminal Railroad Association has signed a ten-year contract with the Union Electric Light & Power Company for this service.

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Anti-Merchandising Order Appealed by Texas Utility

Appeal has been made by the San Antonio Public Service Company from the court order secured by Attorney-General Allred to restrain the utility from engaging in the merchandising of gas and electric appliances upon the contention that the company's charter does not confer power for it to enter into such activity.

The suit maintained that the company exceeded its powers and tended to set up a monopoly because of the longer terms, lower prices and lower overhead of a joint utility-merchandising set-up and that recoverable rates on utility services could be used to cover losses in the merchandising end of the business.

Pending final outcome of this suit, first on the subject in Texas, the state has not sought injunctions to prevent other public utility firms from continuing in the sale of merchandise.

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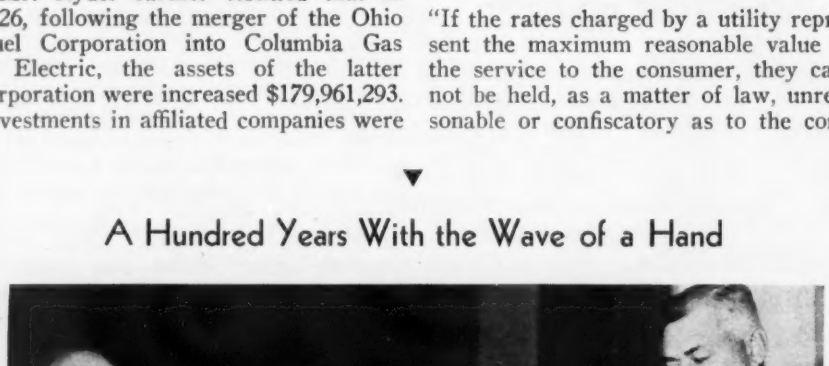
A Hundred Years With the Wave of a Hand



Wide World Photo

From where scattered tallow dips and kerosene lamps pricked the cavernous gloom of the electric building of Chicago's 1933 World's Fair one hundred years fled at the wave of a hand as President W. O. Batchelder of the Electrical Association of Chicago made the gesture over a grid-glow tube which transformed the great hall to a blaze of electric light and color at the official dedication (ELECTRICAL WORLD, October 22, page 553). Shown at the opening ceremonies are: Rabbi Louis Mann, who delivered the invocation; Rufus B. Dawes, president of the Century of Progress Exposition; Bernard E. Sunny, director of the General Electric Company, trustee of the 1933 exposition and director of the 1893 exposition, and Mr. Batchelder.

Only Commission Control Favored by Maltbie

Searching inquiry of the rates and charges to customers by the Yonkers Electric Light & Power Company will be made by the New York Public Service Commission following the disclosure that the utility was endeavoring to establish tariffs in the city of Yonkers through negotiation with the city fathers without benefit of, or consultation with, the state regulatory body.

Chairman Maltbie has announced that a complete investigation will be made by the commission on its own motion and reminds that the utility was virtually directed by the commission about a year ago to revise Yonkers schedules.

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Uniform Charges Asked by North Carolina Board

Notices have been sent to the four large electric utilities serving North Carolina that the State Corporation Commission desires to adopt a schedule of rates "so simple that the ordinary consumer can understand them" and to establish a uniform rate that will apply to domestic service of every description. The notice states also that the commission suggests for the purposes of discussion at a conference called for this week the question of adopting rates that will apply to similar communities with similar conditions.

In issuing the notice the commission appended a statement by the consulting engineer of the body which pointed out some of the factors influencing him in recommending that there be a simplification of the rate structures in North Carolina and an endeavor to bring them more in line with the rest of the country.

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Allis-Chalmers Billings Drop 53 per Cent

Reporting upon the first nine months of 1932 Allis-Chalmers Manufacturing Company shows a loss after all charges including interest on debentures and depreciation, of $2,349,693.73. This compares with a net profit of $1,212,773.49 for corresponding nine months a year ago. Billings in this same period were $11,155,557.75 as against $23,752,592.21 in 1931. During this period there was charged for depreciation and other items the sum of $776,553.25 for which there was no cash outlay.

Bookings for the first nine months of 1932 amounted to $10,149,067.62 contrasted with $18,664,756.68 in like 1931 period. Unfilled orders September 30, 1932, aggregated $6,882,843.45 whereas at the close of 1931 these figures were $7,889,333.58. Net current assets on September 30 amounted to $26,233,489.34 as compared with $28,029,247.85 on December 31, 1931.

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Abitibi Will Be Completed; Bond Exchange to Be Made

Following a series of preliminary negotiations (ELECTRICAL WORLD, July 30, page 134) the Ontario government has passed an order in council guaranteeing the $18,000,000 of twenty-year debentures which the Hydro-Electric Power Commission of Ontario has agreed to exchange for the $20,000,000 bonds of the Ontario Power Service Corporation.

Assurance that the Abitibi Canyon project will be completed under the Hydro-Electric Power Commission of Ontario is seen as the result of agreement between Premier Henry and J. R. Cooke, chairman of the commission. While but 88 per cent of the bonds of the Ontario Power Service Corporation had been deposited before the 10th of this month it was decided to go ahead upon the assumption that sufficient deposits to insure the necessary 90 per cent minimum would be received.

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Load Study Completed by Commonwealth Edison

As part of a general investigation into the load characteristics of its larger classes of customers Commonwealth Edison Company has recently completed the analysis of data obtained from field studies covering a period of more than a year on the loads of about 400 residential customers in groups of seven different types of occupancy. This analysis shows that in Chicago the average residential load factor is 31 per cent, that the diversity factor of this load in respect to the system peak is 1.42 and that lighting and appliances account respectively for 49 and 51 per cent of the energy used by domestic customers.

Housings were built upon poles and watt-hour meters and recording watt-meters were installed on the low-tension side of transformers to determine daily kilowatt-hours and load curves of all of the customers in the different blocks selected for the test. The graphic charts were taken off bimonthly for a period of more than two years. During the period of the study a survey was made of some 9,200 customers to determine appliance saturation. By making a series of deductions and corrections based on this survey and others previously made which show the average number of appliances in the average home the division of residential energy used between lighting and power was determined. Data have already been collected from field studies on commercial and small industrial load classes covering about the same period of time as the study of residential load. These data are now in process of compilation and analysis and will shortly have results available.

Activity Increases; Prices Weak

IN SPITE of all its well-meaning friends, with cures ranging from sugar pills to complete dismemberment, American business appears to be getting better. In just a little while the patient may be strong enough to face a few facts, and the facts are clamoring at the door. To attempt to dodge them with unthinking bravado is sheer folly.

Electrical manufacturers appear to be obtaining some increases in business, for, as reported to "Electrical World" by this group, the energy used in their plants in September stood at 81.4 as against 67.6 in August. Power output for the nation as computed by N.E.L.A. for the week ended October 22 showed a continuance of the gains previously made, now at highest since March. New England continues to show up well. Car loadings touched 650,578 for the week ended October 15, the highest so far this year, and an increase of nearly 25,000 over the previous week. Steel production holds firm at about 20 per cent.

Weakness, or at best lack of strength, in stock and commodity markets continues with persistent emphasis. So low is speculative activity and interest that transactions on the New York Stock Exchange fell to but 551,000 shares on Monday of this week. America's favorite luxury, the automobile industry, is in the extreme doldrums. Production has dropped to a new low record. No manufacturer, except Ford, is turning out as many as a thousand cars a week.

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500-Kv. Transmission in Russia

Completion of the first Soviet high-voltage transmission line, to operate at 500,000 volts, is reported to have been made by the Electrotechnical Institute at Leningrad. According to the *Economic Review* of the Soviet Union this line will be ready for a test transmission of power by November 7.

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R. F. Schuchardt Dies

Rudolph F. Schuchardt, chief electrical engineer of the Commonwealth Edison Company, Chicago, died suddenly, October 25, in a sanitarium in Boston, Mass. A past-president of the American Institute of Electrical Engineers, Mr. Schuchardt was considered one of the leading engineers of this country. He became identified with the Commonwealth Edison Company shortly after his graduation from the University of Wisconsin 1897. He was 56 years of age.

Coming Meetings

National Association of Practical Refrigeration Engineers—Annual meeting, Chicago, Nov. 1-4. E. H. Fox, 435 No. Waller Ave., Chicago.

N.E.L.A. Residential Sales and Industrial and Commercial Sales Bureaus. Edgewater Beach Hotel, Chicago, November 2-4. C. E. Greenwood, 420 Lexington Ave., New York.

National Association of Railroad and Utilities Commissioners—Hot Springs, Ark., Nov. 15-18. James B. Walker, 270 Madison Ave., New York.

American Society of Mechanical Engineers—Annual meeting, New York, Dec. 5-9. C. W. Rice, 29 West 39th Street, New York.

American Association for the Advancement of Science—Annual convention, Atlantic City, N. J. Dec. 27-31. C. F. Roos, Smithsonian Institute, Washington, D. C.

American Physical Society — Annual meeting, Atlantic City, Dec. 28-30. W. L. Severinghaus, Columbia University, New York.

American Institute of Electrical Engineers—Winter convention, New York, Jan. 23-27. H. H. Henline, 33 West 39th Street, New York.

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New River Navigable, Power Commission Says

Reversing the decision of the predecessor commission and refuting certain allegations by the Appalachian Electric Power Company in its suit against the Federal Power Commission the latter has declared the New River from the mouth of Wilson Creek, Va., north, to be navigable waters within the definitions of the federal water-power act.

The Federal Power Commission as constituted on June 1, 1927, declared the New River to be "not navigable" waters, but that the interests of interstate or foreign commerce would be affected by the construction there of power projects. The Appalachian Electric Power Company, having been refused a license, applied on October 6, 1930, for a minor part license and it is this case which is now in dispute.

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Commission Investigation Starts in Pennsylvania

After several delays, which Governor Pinchot characterizes as designed to enable utilities to alter records and to preclude anti-utility findings before election day, the Pennsylvania Senate investigating committee to probe the alleged shortcomings and questionable practices of the Pennsylvania Public Service Commission has held its first official meeting. Accountants and investigators have been going over the books of the Duquesne Light and Equitable Gas companies for several days.

That most sensational of Governor Pinchot's several charges, that the late W. D. B. Ainey, former chairman of the commission, had taken money and received favors from the late A. W. Thompson, president of the Philadelphia Company, presumably yielding favors in return, was the first topic tackled despite the Governor's fears that only constructive considerations for improvement of the regulatory law and future action would be given any considerable attention. Governor Pinchot has agreed to lay before the committee the base for his various sensational charges against the commission and to co-operate with it.

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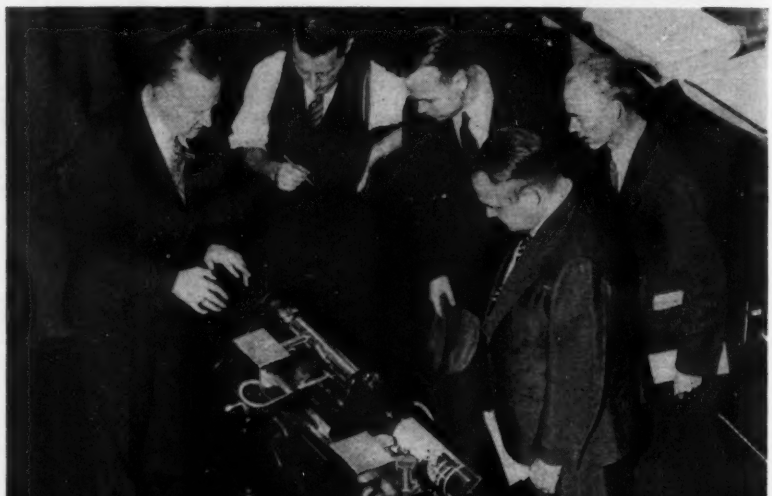
Photo-Engravings Now a Matter of Minutes



With this automatic photo-electric engraving machine inexperienced office help can produce halftone cuts for black and white reproductions of photographs on the printed page in four minutes and at a cost of three-quarters of a cent per square inch. Until now it has required several hours, a complicated acid process and skilled labor to produce. Three-color cuts, which formerly needed 36 hours for production, may now be secured with the same machine in half an hour (ELECTRICAL WORLD, October 22, page 547). The inventor, Walter Howey, is shown demonstrating the machine at a recent meeting in New York.

While the photograph revolves on one cylinder under a beam of panchromatic light, a photo-electric cell scans the area and delivers electrical impulses to a cutting head which rules lines of varying depths on the metal plate mounted on the other revolving cylinder.

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Utility Settles Out of Court in Anti-Trust Law Suit

Union Electric Light & Power Company of St. Louis, Mo., has settled out of court, and will pay the Wiles-Chipman Lumber Company of St. Louis $25,000 in termination of the suit for damages brought by the lumber company, on the charge that the power company had violated the state's anti-trust law in a conspiracy with its parent, the North American Company, to prevent the purchase of electric energy from the Laclede Power & Light Company, a rival concern.

A stipulation has been filed by counsel for both the lumber company and Union Electric with the Missouri Supreme Court. The case has been remanded for further consideration by the trial court and when called up will be dismissed, together with four similar cases now pending.

The case was tried in the St. Louis Circuit Court in 1928 and a jury awarded the lumber company $33,920. Union Electric appealed to the Supreme Court on the ground that the act creat-

ing the Public Service Commission removed the utilities of the state from the jurisdiction of the anti-trust laws. It denied knowing of any conspiracy and denied responsibility for the unauthorized acts of its employees.

The Wiles-Chipman company had charged that Union Electric, through certain employees, entered into a secret agreement with William S. Gallagher, then superintendent of the electric department of the Laclede Gas Light Company, to reject applications for service from concerns which had been obtaining electricity from Union Electric.

The judgment was reversed three times by the Missouri Supreme Court on various grounds, the third time holding the company had followed the wrong procedure in that it had not first appealed to the commission to compel the power company to furnish service.

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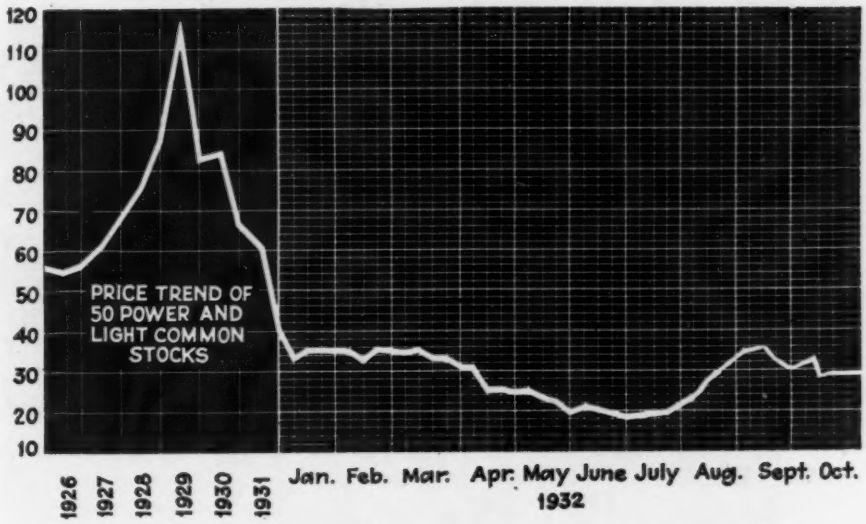
No Rate Petition Unless Discrimination Be Shown

Ruling that, unless there was evidence that the lighting rate was high because of unusually low rates for other purposes, E. Coyne, representing a group of petitioners seeking lower rates from the Cambridge Electric Company, had no right to go into the general rate situation of the company, as established by the commission in 1927, Chairman Attwill of the Massachusetts Department of Public Utilities stated last week that petitioners ought not be allowed to conduct a "fishing expedition" into the company's affairs.

The petitioners also sought to have company officials ordered to testify regarding new business costs, which Mr. Coyne alleged jumped 300 per cent.

Stocks Decline Moderately



Few price changes occurred during the past week, characterized by dull trading. The "Electrical World" index declined slightly from 28.8 to 28.0

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British Energy Output Continues to Advance

Continuing the encouraging advances made in earlier months of this year the September figures for energy output in the United Kingdom showed 922,000,000 kw.-hr., as against 875,000,000 kw.-hr. in the same month last year. This represents an increase of 5.4 per cent and affords a new high for that month.

For the first nine months of the current year Britain's electricity output amounted to 8,632,000,000 kw.-hr., against 8,058,000,000 kw.-hr. in 1931. The increase of just over 7 per cent was achieved when output had slumped heavily in almost every other country. 1931 output exceeded 1930 by 5 per cent.

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Current Earnings Reports of Electric Light and Power Companies

Operating Companies

	1932	1931	Per Cent Increase	Operating Ratio 1932	Operating Ratio 1931
Consolidated Gas, Elec. Lt. & Pwr. of Baltimore (Eight mos. ended August 31)					
Gross earnings.....	$18,359,084	$19,035,168	— 3.6	67	67
Net earnings.....	5,965,774	6,224,440	— 4.1	..	..
Net profit.....	3,459,117	3,929,765	—12.0	..	..
Detroit Edison (Year ended September 30)					
Gross earnings.....	45,119,324	50,482,103	—10.6	70	66
Net earnings.....	13,666,167	17,316,804	—21.1	..	..
Net profit*.....	7,639,700	11,374,442	—32.8	..	..
Duquesne Light (Year ended August 31)					
Gross earnings.....	26,207,148	28,465,988	— 7.9	43	42
Net earnings.....	15,002,875	16,393,155	— 8.5	..	..
Net profit.....	11,265,887	13,429,359	—16.1	..	..
Eastern Texas Electric (Year ended August 31)					
Gross earnings.....	8,181,586	9,604,103	—14.8	69	69
Net earnings	2,544,976	3,007,329	—15.4	..	..
Net profit.....	78,530	628,633	—87.5	..	..
Louisville Gas & Electric (Year ended August 31)					
Gross earnings.....	10,101,519	10,861,315	— 7.0	55	53
Net earnings.....	4,499,293	5,069,024	—11.2	..	..
Net profit.....	1,864,037	2,355,559	—20.9	..	..
Puget Sound Power & Light (Year ended August 31)					
Gross earnings.....	14,237,778	16,318,819	—12.8	61	63
Net earnings.....	5,562,774	6,025,270	— 7.7	..	..
Net profit.....	656,410	686,826	— 4.4	..	..
Virginia Electric & Power (Year ended August 31)					
Gross earnings.....	15,993,246	17,100,782	— 6.4	66	66
Net earnings.....	5,530,198	5,767,386	— 4.1	..	..
Net profit.....	2,479,385	2,851,884	—13.1	..	..

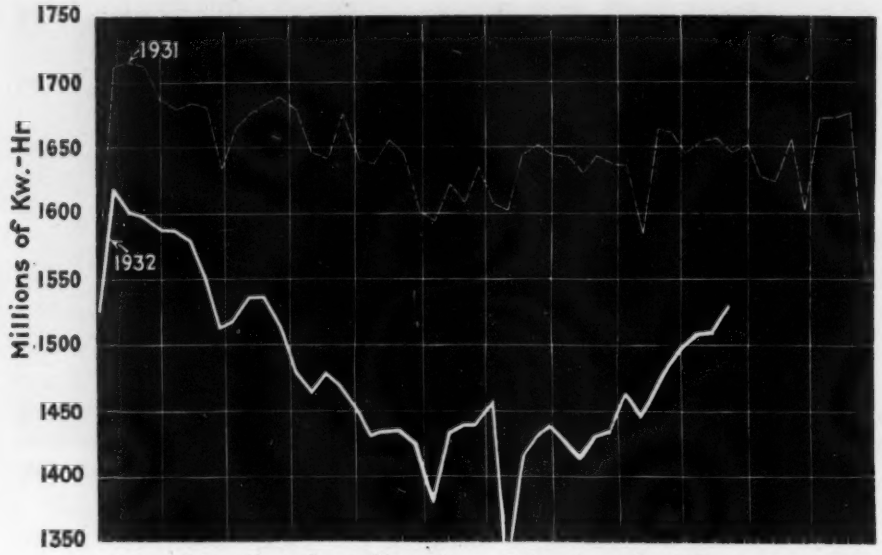
Holding Companies

	1932	1931	Per Cent Increase	Operating Ratio 1932	Operating Ratio 1931
American Water Works & Electric and subsidiaries (Year ended August 31)					
Gross earnings.....	$45,698,182	$51,642,491	—11.5	55	58
Net profit.....	3,737,843	4,766,297	—21.5	..	..
Electric Power & Light and subsidiaries (Year ended August 31)					
Gross earnings.....	76,166,498	84,568,245	— 9.9	57	57
Net profit.....	756,946	4,812,259	—84.1	..	..
National Power & Light and subsidiaries (Year ended August 31)					
Gross earnings.....	73,979,925	79,331,397	— 6.7	59	61
Net profit.....	7,662,408	9,335,149	—17.9	..	..
Philadelphia Company and subsidiaries (Year ended August 31)					
Gross earnings.....	50,226,200	58,703,956	—14.4	65	60
Net profit.....	6,704,071	11,963,399	—43.8	..	..
Public Service Corporation of New Jersey and subsidiaries (Year ended September 30)					
Gross earnings.....	129,954,866	140,535,041	— 7.5	66	67
Net profit*.....	29,681,074	31,348,487	— 5.3	..	..

* Balance available for preferred and common dividends.

Gross earnings — (Operating Companies) Gross operating revenue. (Holding Companies) Gross operating revenue plus other income. Net earnings — Earnings after deduction from gross earnings of operating expenses taken to include taxes, depreciation, maintenance, operating, etc. Net profit — Balance available from income for common stock dividends.

New England Crosses the Line



STEADILY the output of electric light and power plants is mounting. For the week ended October 22 it rose 1.3 per cent to 1,528,145,000 kw.-hr. and fell short of the corresponding 1,646,531,000 kw.-hr. in 1931 by only 7.2 per cent. This is the closest approach to last year's production in any week since that of February 13.

Even more favorable than this showing for the industry as a whole is that for the Atlantic seaboard, where output came within 1.2 per cent of last year's. Further, for the first time in the entire year one region, New England, has exceeded its 1931 figure. This brings New England ahead also of its production in 1930. In the Central industrial area the approach to 1931 is the closest since the middle of February. The Pacific coast alone reported a slight relative recession.

Weekly Output, Millions of Kw.-Hr.

Week Ended	1932	1931	1930	1929
October 22	1,528	1,647	1,747	1,824
October 15	1,508	1,656	1,729	1,799
October 8	1,506	1,653	1,724	1,806
October 1	1,499	1,646	1,711	1,819
September 24	1,491	1,660	1,714	1,778

Per Cent Change from 1931

Region	Week Ended Oct. 22	Oct. 15	Oct. 8
Atlantic Seaboard	—1.2	— 4.7	— 4.4
New England alone	+0.6	— 0.2	— 2.4
Central industrial	—9.3	—11.3	—10.8
Pacific Coast	—9.8	— 9.4	—10.1
United States	—7.2	— 9.0	— 8.9

▼

Pole Purchases Decline 46.9 per Cent in Two Years

From a total of 4,556,895 in 1929 the purchase of treated and untreated poles by steam and electric railroads, electric light and power companies and telegraph companies decreased 46.9 per cent to 2,418,366 in 1931, according to figures just released by the U. S. Bureau of the Census. In 1931, as in 1929, the number of pine poles purchased exceeded that of any other individual species. The accompanying table shows other wood-pole data.

Kind of Wood	1931 Treated	1931 Untreated	1931 Total	1929 Treated	1929 Untreated	1929 Total
Pine	1,083,246	39,825	1,123,071	1,714,964	150,460	1,865,424
Cedar:						
Western red	651,560	92,205	743,765	1,237,643	190,012	1,427,655
Northern white	177,214	124,737	301,951	440,023	194,041	634,064
Southern white	10,594	6,460	17,054	4,867	19,290	24,157
Southern red	6,784	4,241	11,025	3,244	6,173	9,417
Chestnut	96,398	90,658	187,056	298,737	205,151	503,888
Cypress	5,498	9,817	15,315	5,080	20,460	25,540
Douglas fir	4,814	2,243	7,057	28,131	16,617	44,748
All other	292	11,780	12,072	627	21,375	22,002
Total	2,036,400	381,966	2,418,366	3,733,316	823,579	4,556,895

▼

Utility-Municipal Segregation

Wisconsin Public Service Commission has ordered the city of Elroy to operate its joint water and electric utility separate from the functions of municipal government. Hereafter the utility is to bill the city for service given it and must pay taxes to the city. The utility also must pay the city for rent of office space in the city hall. It was also ordered that electric customers be charged on a block-rate basis.

▼

Federal Power Commission Control Asked in Oregon

Pending the time when sufficient jurisdiction shall be accorded the Oregon Public Service Commission to rule on all stock and bond issues of utilities, Charles M. Thomas, one-man commission of that state, has requested that the Federal Power Commission assume jurisdiction in the sale of the issues of the Portland General Electric Company, Pacific Northwest Public Service Company and Portland Traction Company (ELECTRICAL WORLD, October 8, page 485).

"It is my understanding," Mr. Thomas stated in addressing the commission, "that the federal power act provides in effect that in states where jurisdiction is not vested in the state utility commission the Federal Power Commission may, through proper procedure, assume jurisdiction over stock and bond issues of state utility companies and retain the same until state jurisdiction is granted."

Mr. Thomas explained that his request was based on certain testimony offered at a hearing now being conducted in Portland in connection with financial transactions involving the utilities named (ELECTRICAL WORLD, October 8, page 485).

"This commission hopes," he concluded, "that the Legislature which meets in January will by legislative act grant supervision over all securities of local operating companies. In the meantime, however, the commission is very much concerned with what may happen in the interval."

▼

Nebraska's Hydro Resources Reviewed by State Engineer

As the result of a three-year survey of the water resources for power and irrigation of the state of Nebraska State Engineer Roy Cochran has submitted to Governor Bryan a comprehensive report of the situation.

Discussing the power possibilities, the report says in part: "The studies, surveys and proposed plans for the development of irrigation and power in central Nebraska demonstrate that hydro-electric power can be made to serve as an economical and integral part of the structures required for this proposed irrigation development. It is believed that the income would provide sufficient revenues for the amortization

of all of the construction costs within a reasonable period of time. Eight different possible reservoir sites are indicated as also carrying power development possibilities. On the matter of irrigation the survey says that when the water supply of the Platte River is completely utilized by the combination power and irrigation plans there is enough water to irrigate 1,500,000 acres with an application of 12 in. per year or 1,120,000 acres with 15 in. The total amount of storage capacity required would be 1,556,000 acre-feet, which is an excess capacity of that computed of more than 50 per cent.

▼

G. E. "House of Magic" to Be at World's Fair

To occupy the largest space awarded any one manufacturer at the Century of Progress World's Fair in Chicago in 1933, 9,000 sq.ft., General Electric will transport that spectacular section of the Research Laboratory in Schenectady known as the "House of Magic" to the exposition. In a setting designed by Raymond Hood, General Electric will concentrate its entire display of electrical apparatus.

In addition to the "House of Magic" equipment will be installed to illustrate the application of electricity to transportation by land and water, to scores of industrial uses and to the home. The presentation of home appliances will be particularly complete, with special emphasis on electric cookery, refrigeration and air conditioning.

The exhibit will be housed in a series of sections beneath an observation balcony backed by massive pillars, 13 ft. in diameter and rising to a black ceiling 71 ft. above the floor. Pillars, balconies and partitions will be decorated with light in the modern motif characteristic of the exposition.

▼

Florida Board Denies Jurisdiction

Pointing out that the Florida State Railroad Commission has no authority over light and power companies in that state, Chairman E. S. Mathews of the commission has advised protestants against electric utilities that the municipal government in Florida offers the only recourse in elements of dispute. Mr. Mathews states that the law creating the commission failed to give the necessary authority.

▼

Major New Construction This Week

REFRIGERATING machinery, motors, controls, conveyors, etc., will be installed by Public Market Company, Portland, Ore. A $1,400,000 project.

Motors, controls, regulators, switchboard, instruments and conveyors needed for plant of Palmer Match Company, Akron, Ohio. Cost $300,000.

Heavy-duty motors, controls, machine drives, hoists and loaders will be installed at Wilkes-Barre, Pa., coal breaker of Glen Alden Coal Company. Cost over $175,000.

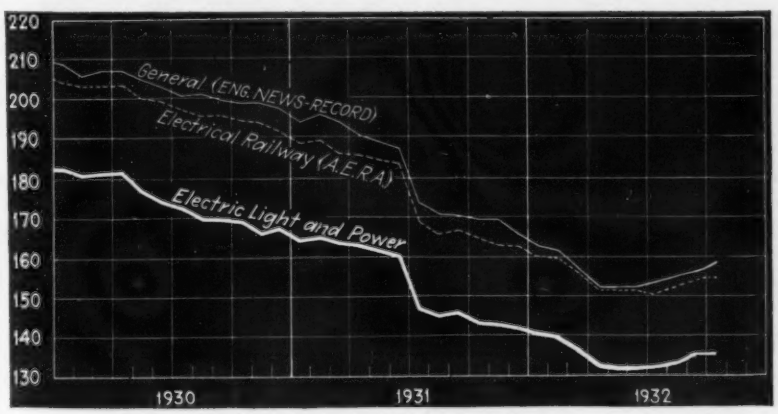
A $450,000 fund is being arranged by Oelwein, Iowa, for city-owned electric light and power plant.

Bids soon to be asked by Bureau of Reclamation, Denver, Colo., for four 115,000-hp. and two 55,000-hp. turbine units with accessories, six oil pressure governors and one 30-ton electric traveling crane for Hoover Dam project. Early in 1933 same office will ask bids for four 82,500-kva. and two 40,000-kva. generators with auxiliaries for same project.

Machine drives, motors, etc., needed for paper products and printing plant of Shellmar Products Company, Chicago, Ill. Cost about $100,000.

Electric hoists, machine drives, motors, regulators, electric tools, conveyors, etc., required by George W. Kneass Company, San Francisco, Calif., rebuilding of shipyard. Cost over $100,000.

Construction Cost Trend Upward



NO APPRECIABLE change in construction costs in the electric light and power industry is disclosed in the index in the accompanying table. The general engineering construction index rose slightly.

This is in contrast with the downward movement at this season in the past two years and therefore indicates a relative rise in conformity with the actual upward trend of recent months.

The effect of these contrary movements in 1931 and 1932 has been to bring the present cost within 6 per cent of last year's, whereas the difference was 7 per cent a month ago and 9 per cent two months ago.

This index now appears in ELECTRICAL WORLD in the last issue of each month. The entire series, covering a period of nearly twenty years, was published in the February 13, 1932, issue, page 318.

Construction Cost Indices: Electric Light and Power, Electric Railway and General

	Base: 1913 = 100		
	Electric Light and Power*	Electric Railway*	General—*Engineering News-Record*
October, 1932...	136	155	159.2
September, 1932	136	155	158.0
August, 1932....	133	153	156.8
July, 1932.....	132	150	153.4
June, 1932.....	131	150	152.2
October, 1931...	144	165	169.8
Last 5 yrs. high. Month.....	184 Apr. '29	206 Nov. '28	210.4 Feb. '29
Last 5 yrs. low... Month.....	131 June, '32	150 June, '32	152.2 June, '32

*Computed by Albert S. Richey.

Bill-Rendering Experiment Tried in Illinois

With the permission of the Illinois Public Service Commission the customers in one district served by the Public Service Company of Northern Illinois are participating in a bill-rendering experiment designed to reduce no-reading difficulties and possible misunderstandings.

If a meter reader fails to gain entrance an estimated bill is sent based on an average month's consumption. An accompanying notice reads:

"Payment of this bill is not obligatory, but is an arrangement for your convenience. If paid, the amount will be credited to your account. When a reading of your meter is obtained your account will be adjusted upon the basis of actual consumption."

▼

New York Metal Prices

	Oct. 18, 1932 Cents per Pound	Oct. 25, 1932 Cents per Pound
Copper, electrolytic...	6.25	5.75
Lead, Am.S.& R. price.	3.00	3.00
Antimony.....	5.625	5.50
Nickel ingot.....	35.00	35.00
Zinc, spot.....	3.40	3.40
Tin, Straits.....	24.40	23.50
Aluminum, 99 per cent	23.30	23.30

System Rates Before Supreme Court

Announcement that it would hear and determine a case involving the issue of whether public utility rates for service supplied one community by a company which serves several should be based upon the value of the property used in serving the particular community or upon the company's entire system has been made by the Supreme Court of the United States. The issue is that of the so-called Martinsville (Ind.) case (ELECTRICAL WORLD, October 22, page 550).

▼

Drumm Train Runs Lengthened

Daily mileage of the Drumm battery train on the Great Southern Railway in Ireland (ELECTRICAL WORLD, October 15, page 521) has been increased to 230 upon the showing made in operation during the past month. Battery-charging periods of 25 minutes are being used. Operating hours from 7 a.m. to midnight are observed.

▼

Telephone Income Declines

Operating income of $150,899,851 is reported by 103 telephone companies for eight months ended August 31 in their monthly statements to the Interstate Commerce Commission. This total compares with $185,593,992 in the corresponding period of 1931. Gross revenues were $703,053,403, against $777,893,241.

▼

Associated Appraisal Independent

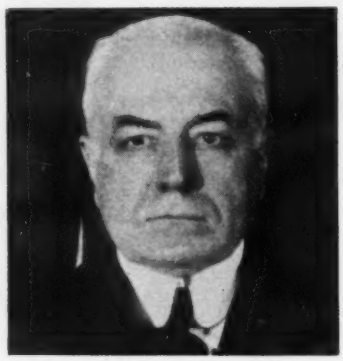
Contrary to the statement appearing in the October 8 issue of ELECTRICAL WORLD, page 484, referring to a phase of the Federal Trade Commission hearing of the Associated Gas & Electric Company, it develops through reference to the hearing records that the reappraisal of properties acquired by Associated was conducted by the E. J. Cheney Engineering Company, an independent organization, and not by an Associated-controlled firm, as was stated. Dividends of the Erie Lighting Company, mentioned as declared but not paid, should have been referred to as accrued but not paid. The information as originally published was obtained from sources ordinarily reliable.

▼

Jap Light Menace Told

Representatives of the American lamp industry told their grievances and troubles in regard to the importation of electric lamps from Japan at a meeting last week before the U. S. Commissioner of Customs. Among the points brought out were that Japanese lamps were sold at a higher price in the home market than they were here, some lamps sold here for 2.6 cents for which the material alone cost 3.24 cents in this market, 20 per cent of the lamps used in this country are imported, 18,000,000 were imported in September and 79,000,000 lamps were brought into this country in the first nine months of this year (ELECTRICAL WORLD, October 22, page 551).

▼



One of the main pillars of the utility structure is the investor. His support of the industry is based on confidence, but his confidence is not lightly bestowed — it is a plant of slow growth. It was no small thing for the utilities to win the approval of their army of investors; but having won it, it is their duty to protect and safeguard it by every means in their power as one of the indispensable requisites of efficient and economical service.

GEORGE B. CORTELYOU,
President
National Electric Light Association

[Mr. Cortelyou in a recent message to N.E.L.A. points to a principle which will be increasingly considered in formulating policies on rates and valuations, sales and competitive markets on many properties before many more months have passed.]

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R. C. A. Trust Suit Settlement?

That settlement of the government's anti-trust suit against the Radio Corporation of America has been sought by the Department of Justice through divorce, out of court, of that corporation from General Electric and Westinghouse is reported from Washington.

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Power Commission Seen Strengthened

Commenting upon the decision last week of the U. S. Supreme Court in the Clarion River Power case (ELECTRICAL WORLD, October 22, page 547) George Otis Smith, chairman of the commission, stated that "action of the court is highly satisfactory to the commission, in that it removes the only obstacle to the commission's carrying out the evident intent of Congress." Oswald Ryan, counsel for the commission, stated that if the court had granted a review and reversed the lower court's findings the federal water-power act would have been destroyed and the commission might as well close its doors.

New York P. & L. Rates Revised

Simplification of rates to industrial and institutional customers in the territory served by the New York Power & Light Corporation, as proposed by the company for commission approval, would mean three classifications instead of the nine now in effect and aggregate savings to about 6,000 customers of probably $170,000 a year, according to John L. Haley, vice-president of the utility.

▼

Kansas Rate Cuts Sought

Electric light and power companies serving 26 towns in north central Kansas have been requested by Mayor D. F. Stanley of Mankato, Kan., to volunteer rate reductions in a co-operative movement to reduce energy costs. "This is not a radical move to injure the companies and their stockholders," declares Mayor Stanley. "No court or commission action is contemplated, save as a last resort. It is proposed that unless voluntary reductions are made the utilities will lose in public and private business until of necessity they will meet the requirements of the situation."

▼

Indiana's Valuation Law

Though the law passed at the last session of the Indiana Legislature providing that the assessed valuations for taxation in that state for utility properties should be the same as the valuations for rate-making purposes (ELECTRICAL WORLD, August 20, page 226) contained an emergency clause making it effective August 4, the Indiana State Tax Board announces that it will not be effective until March of 1933, as valuations for this year's levies were all made before a date at which it would have been possible to change them.

▼

Heater Company Makes Own Motor

Seeking to reduce manufacturing costs, that the price of its product to the purchaser might be reduced to hitherto unrealized levels, the Williams Oil-O-Matic Heating Corporation, maker of oil burners, now produces its own motors. The move is cited by C. U. Williams, president, as one of the most successful of such moves which his company has undertaken. During September this organization sold 35.3 more oil burners than in the same month last year. The factory is now operating 23 hours a day.

▼

Water Shortage Relieved in South

Hydro-electric reservoir conditions in practically all the Southeastern states are reported improved by a period of

excessive rainfall extending from October 15 to 18. Total precipitation of from 5 to 9 in. has occurred. Prior to the storm many of the larger storage reservoirs in the area affected had been drawn to very low levels. Some streams in North Carolina had dropped below previous minimum records (ELECTRICAL WORLD, October 1, page 422).

▼

Energy Use Varies Widely for Electric Soil Heating

Based upon a study of electric hotbed installations in the territory of the Buffalo, Niagara & Eastern Power Corporation by Morris H. Lloyd, rural service supervisor for that organization, variations in energy use between 0.07 and 0.43 kw.-hr. per 100 sq.ft. per hour appear to be about what may be expected in such work.

Mr. Lloyd states that in the case of five installations, two hotbeds, two propagating benches and a pair of cutting beds, all heated by lead-covered, soil-heating cable—about 148 ft. of cable per 100 sq.ft. of soil being used for the hotbeds and cutting beds and about 200 ft. per 100 sq.ft. for the propagating beds, the cable being divided into 72-ft. circuits—(thermostat control of temperature was used) energy consumption ranged from 0.3 to 0.43 kw.-hr. per 100 sq.ft. per hour for propagating and hotbeds respectively. The cutting beds required 0.07 kw.-hr. on the same basis.

For the hotbeds the temperature was maintained at 65 to 70 deg. The total energy for a sixteen-sash frame raising tomatoes, cauliflower, peppers, asters and delphinium, March 28-April 13, was 1,496 kw.-hr., or $44.88 at 3 cents a kilowatt-hour.

In propagating hotbeds for lettuce, tomatoes, cabbages, peppers and eggplant in a 72 sq.ft. area, temperature maintained at 72 deg. energy for seven weeks totaled 266 kw.-hr., or $7.98 at 3 cents a kilowatt-hour. In another bed, with lettuce, cabbage and cauliflower, energy for eight weeks was 287 kw.-hr., or $8.61 at 3 cents.

In two sixteen-sash electrically heated cutting beds totaling 776 sq.ft., used for rooting flower cuttings, soil temperature maintained at 72-76 deg. in 40 days starting June 20, 523 kw.-hr. was used costing $15.69 at 3 cents, or 1¼ cents per day per sash.

▼

Oklahoma G. & E. Rate Probe

General investigation of the rate structure of the Oklahoma Gas & Electric Company, which Vice-President George Ade Davis says will be welcomed, has been ordered by the Oklahoma State Corporation Commission.

110-Volt Mercury Lamp Needs No Auxiliaries

The day of the practical 110-volt, self-starting gaseous-discharge type of lamp for ordinary use in the familiar type of socket and in a form dispensing with complicated auxiliaries appears to be drawing nearer.

Last week private demonstrations were made in New York of a tubular source about 5 in. long, with a standard screw-socket base which contained mercury vapor and utilized barium-oxide type electrodes at either end. A small conductor on the surface of the tube joins the electrode at the far end to the energy source. This lamp operated in series with a 55-volt, 500-watt incandescent lamp in a series-wired, two-outlet socket and gave, with the incandescent lamp, about the equivalent light of a 1,000-watt incandescent lamp at what was said to be about 700 watts energy rating.

The lamps both operated instantly as soon as the switch was turned on, but with considerable overvoltage on the incandescent, gradually decreasing there for about three minutes until normal operating brilliancies and conditions were self-established. Operation once interrupted cannot be resumed until the mercury lamp has cooled, however. This necessitated a three- or four-minute wait. The incandescent lamp serves as the ballasting resistance for the mercury lamp. In conjunction they offer a stimulated daylight effect on objects illuminated.

Thus two difficulties have been solved, 110-volt supply operation and complicated auxiliaries. There remains the difficulty of restarting when hot (the Philips and Osram Companies, abroad, are said to plan a fixture with two mercury tubes to permit rapid restarting) and the necessity of allowing for a double source at the point of use.

Life of the glass, a limiting factor in some gaseous discharge lamps, is said to be about 2,000 hours. The lamp is the invention of Dr. H. S. Spanner.

▼

Vector Quantities Indicated Directly Speed Tests

Direct indication on a vernier dial of phase angles, to a fraction of a degree, and of components and scalar quantities of current and voltage on indicating meters saves time and avoids errors in adjusting the commutating field shunts on large a.c. railway motors for Westinghouse. The impedances of the meters are such that their introduction into the circuits has negligible effect on distribution of current and voltage drops.

The vernier dial of this vectometer on which the phase angles are read is connected to the rotor of a phase shifter, which has a three-phase primary winding and a two-phase, four-wire secondary balanced winding. By throwing from the "in phase" to the "quadrature" position the switch that is connected to the secondary the standardizing current is shifted 90 deg. In reading scalar quantities the difference between the successive dial readings gives the phase displacement of the quantities.

Power-factor measurements are simplified. In connection with the study of the symmetrical component method of analyzing unbalanced polyphase conditions, multiplication by j, a, and a^2 can be performed simply by rotating the phase shifter through the proper number of degrees.

EDITORIALS

L.W.W.MORROW
Eritor

We commend this utility philosophy

WE ARE very glad to publish the address of David E. Lilienthal before the American Bar Association in this issue of ELECTRICAL WORLD. We hope that every electrical man will read and consider the article, for it is the most definite in the statement of facts and in the development of regulatory suggestions that has come to our attention.

The basic idea of Mr. Lilienthal is that regulation starts with the customer and moves "upstream" toward the holding company. In his opinion federal regulation is not needed, but state regulation should be enlarged to give authority over all relations of the operating company to the holding company. This would give the state authorities full control of financial transactions, dividend payments and management and construction fees and payments and would render unnecessary any direct state or federal regulation of holding companies.

Experience indicates that the electrical industry cannot defend itself against the "bad actors" within its ranks, and under stress conditions even "good actors" succumb to pressure and become "bad actors." In the public interest and in the interest of the industry the enlarged function of the state commission as proposed by Mr. Lilienthal should be used as a safeguard. Abuse of the authority granted the commissions is a hazard that in general will be less than that already too frequently introduced by the present uncontrolled conditions.

It is also gratifying to find Mr. Lilienthal advocating greater decentralization in holding company management functions whereby local property executives would be given responsibility and power and holding company jurisdiction would be limited chiefly to general policies and developments. This article by an experienced state commissioner brings state regulation into a new and sharper focus and eliminates many false generalities that too frequently obscure the situation.

Adequate house wiring promoted

WIRING in the majority of residence buildings today is far below what modern practice demands. Even many new structures are incompletely wired when judged by material and equipment on the market, as well as service within reach of even modest purses. This gap between the electric service user and the resources of the industry is in no small part due to the absence hitherto of widely accepted standards of wiring layout. Hence the appearance of a set of standards of wiring adequacy for the home under the sponsorship of seven leading industry associations and the indorsement of the inspecting group is a long step forward and means ultimately better service to the public, lower unit prices for energy consumed, increased power system outputs and more business for manufacturers, wholesalers and contractors.

These standards, which are presented in condensed form elsewhere in this issue, are designed to insure a reasonable completeness of service consonant with late advances in the electrical art. They do not deal with equipment *per se,* but with layouts, and can therefore readily be incorporated in architects' and builders' specifications. There is no reason why they should interfere with the Red Seal or other certified wiring practices like

those of the Western Massachusetts Companies. In a word, they constitute an authoritative statement of what adequate wiring service is in the modern residence or apartment, and relegate to the past the "bare bones" ideas of house wiring layout, which have too long led to meager installations, often resulting in relatively high costs for later modernization.

The public has little technical knowledge of wiring and its possibilities and such a clear-cut statement of good practice as this is should be extremely useful in furthering home electrification. All branches of the electrical industry stand to gain by making adequate installations.

Conventions or forums?

IN THE course of years many conventions of N.E.L.A. geographic divisions have imperceptibly grown into meetings at which the principal activities of many utility men in attendance are to play golf and to allow manufacturers' representatives opportunities to entertain them. As a matter of form, more or less, convention attendants sit in the scheduled sessions, briefly and un-numerously, and submit to being talked at by imported talent with or without a message in any particular case. Such ideas, if any, that a utility man acquires at this type of convention are contracted by mere exposure, by contagion only; he does not get them by inoculation and assimilation into his system.

The Great Lakes Division, always a pathfinder among N.E.L.A. groups, although in this instance perhaps a pioneer by no very specific intention, has shown how regional industry conventions can be of actual and tangible value to those participating in them. The Great Lakes convention this year was billed as an "Executive Conference." It was not that at all, because too many brass hats were conspicuous by their absence from it. Yet this was probably the best meeting the division ever had. It was the best because every one present took part in it, because there was an ever-present consciousness in the sessions that those gathered together were not there to be told how to run their business, but to discuss their common problems and to find solutions for them themselves.

Instead of being an exhibition of trained seals imported at great expense from distant and little known countries, the meeting was an actual witenagemot of the electric utility industry in the Great Lakes region. The French Lick meeting should point a way toward the revitalization of geographic conventions by making them real forums for discussion of current problems.

Economical power

POWER always will and should be produced on an economic basis. This is the condition that must be met in any discussion of utility vs. private plant power production and supply. And present conditions call for a clarification and declaration of utility policy with respect to this economic law. Is it their policy with respect to private plant competition to be purely defensive or will they say it is their specialized business and to the advantage of their customers for utilities to produce and supply all electric power in their territory?

If the principle is accepted that the utilities will produce and supply all electric power needs in a market region, undoubtedly they must build and operate many small power stations in industrial plants and small cities. If a small local plant is justified, then they must own or operate it to supply the customers' needs in electric power, and possibly steam, and must frequently tie this station into their system in order to reap the economies possible in power interchanges and diminished local and system reserve capacity. If this principle is accepted no customer-owned or municipally-owned plant will be built and small plant competition will be eliminated because of the over-all decreased costs possible only to the utilities through interconnection.

Despite invested values in the existing systems, despite excess capacity in the present power stations, despite transmission service to the customers and despite some traditions to the contrary, present competitive power conditions, in many instances, will either force business from the utilities or, as an alternative, make them adopt the broad principles outlined previously whereby they will make new investments in local power plants upon a basis of earning returns on this new investment independently of the magnitude of existing system investments. There is no competitive power if the principle of economical power is followed to its logical conclusions.

Reconciling Holding Companies with Public Interest

By DAVID E. LILIENTHAL*

Wisconsin Public Service Commission
Madison, Wis

OUR national life has entered upon a period marked by rapid economic and social changes. The stern realities of a major depression have already forced far-reaching adjustments in business and government and have profoundly affected public opinion. New formulations of business practice and public policy are in the making.

Among the issues which are being currently re-examined in the light of changed conditions none is more acute nor vital than the question of what control, if any, the state should exercise over the public utility holding company.

Concrete instances are often the best way to lay the groundwork for a discussion of principles. I should like, therefore, to lay before you briefly a number of actual cases which have come to my attention in recent months. These are illustrative of the practices of a few utility holding companies which are seriously injurious to the public interest, and which in their repercussions on utility credit and public relations inflict grave injury upon the entire public utility industry:

1. An operating utility issued and sold a large amount of short-term notes. Approval by the state commission was not required of short-term temporary financing. The proceeds of these notes were then loaned to the holding company on the holding company's unsecured note. The holding company was at that time in financial difficulties. When the notes became due the holding company had failed and could not meet them. The state commission was petitioned by the operating utility to authorize the issuance of additional securities to refund its short-term notes. The commission, although holding that the loan was not for a proper corporate purpose, authorized the new securities only because the alternative was receivership for the operating company.

2. Virtually all of the employees of an operating gas and electric utility were licensed to sell securities of the holding company. These employees solicited sale of the holding company's securities, including common stock, to customers of the operating company and others, during business hours when their wages were being charged as expenses of the operating company, as well as when they were not on duty. The same operating company was directed by the holding company to encourage its employees to subscribe to the holding company's securities, a plan being in force whereby part of the price of the securities was "contributed" by the operating company. These "contributions," so called, were treated as additional compensation to the operating company's employees and were charged to operating expense or capital account of the operating company.

3. Almost all the financing of a certain operating company between 1928 and 1932 had been by the sale of its *own* preferred stock to its own customers. Its ratio of funded debt was high. Liberal dividends on common stock had brought its surplus down to a nominal sum. Thereafter the holding company failed under spectacular circumstances. The operating company's credit was so impaired by its connection with the holding company and its sad balance sheet showing that according to its president it has been unable since that time to sell its own preferred stock and it now has no means whatever to finance extensions and additions, except through earnings.

4. An operating company purchased supplies from its holding company at a price considerably in excess of the price actually paid by the holding company, which was able to secure favorable prices because of centralized buying. In another case an operating company was charged 8 per cent for funds loaned to it on open account by its holding company when the funds had been secured by the holding company at 5½ per cent.

5. An operating company's stock was owned by a holding company which also controlled various construction, engineering, advertising, accounting and supply corporations with which the operating company had contracts for a variety of services and supplies. The officers of the operating, affiliated and holding companies refused to give the state commission having jurisdiction over the operating company full information concerning the various contracts existing between the operating company and its affiliates, or to disclose the details of the intercorporate relationship.

6. An operating company's balance sheet showed property and plant of $50,000,000, $2,500,000 of abandoned and unamortized property loss and $1,000,000 reported surplus. Retirement reserve was less than 2 per cent of the property and plant, and the annual reservation for depreciation or retirement was less than 1 per cent of fixed capital, although three times this amount was claimed for tax purposes. The company's holding company was in dire need of funds for interest on its debentures and to maintain the market for its common stock. For the past several years the company had declared and paid common dividends of 8 per cent to the holding company amounting to about $3,000,000, whereas less than $75,000 was passed to reported surplus during that period. The holding company failed. The operating company, being without a real surplus and with inadequate reserves, has a demoralized credit and has had to pay a prohibitive cost for the small amounts of capital it has had occasion to raise in recent months.

I have set this clinical material before you as the best method of raising this question: Can regulation of electric, gas and telephone utilities by the states be effective without some form of regulation of the holding company? Can the interests of the consumer and the public investor be protected without state control of the holding company?

Generally speaking, the attitude of utility representatives has been that the holding company should be free from governmental control. Their position has been that its operation is distinct and unrelated to those interests which the state should protect, namely, the rates of the consumer and the security of the investor in operating company stocks and bonds. With this position I find myself in disagreement. In theory the operating companies may be wholly independent entities and therefore regulation of them may be adequate to protect every interest. Experience has shown, it seems to me, that

> **practically all the relations of the operating company to a holding company are of the most immediate concern to any state commission alive to its responsibilities.**

One of the best illustrations of the force of this point, it seems to me, is the story of the acquisitions of oper-

*Abstract of address at annual meeting of American Bar Association, Washington, D. C.

ating properties by holding companies during the late "flush era." You will recall that it was urged by some that whether an excessive price was paid by a holding company for an operating company's property or common stock was of no concern to the state commission having jurisdiction over the operating company. It was said that the state commission's concern is solely with the operating company, and that its sale at an excessive price to a holding company could in no way affect the utility's rate-payers or the state commission's ability to protect them, since rates are based on the value of the operating utility's property. Here we have the issue of the relation of the holding company to effective state regulation of operating company rates, service and securities neatly raised.

In an article published in the *Columbia Law Review* in April, 1929, I discussed the high prices paid for operating utility stock by holding companies. I said that if "the properties had not been selected with sufficient foresight, the expected economies from integration fail to materialize, or for other reasons, such as a general depression, the dividends received" on the shares purchased by the holding company "fall far short of what was anticipated" when the purchase was made, the holding company will be under great pressure to direct the operating company to follow "a policy of deferring maintenance, renewals, and depreciation charges, postponing extensions and in other ways cutting corners which would increase net income at the expense of service."

Service charges and rates

Not only service, but the consumer's interest in rates may also be affected by unduly high prices paid by holding companies, it was suggested. Because, "if the dividends which were anticipated" when the holding company bought the stock "have not been realized, there would clearly be pressure upon the holding company to augment its earnings (from the operating utility) in other ways," and perhaps to impose a policy upon subsidiaries as to rates adverse to the legitimate interest of rate-payers. The article referred to then states: "Suppose in spite of every effort to prevent it our hypothetical (holding) company gets into difficulties 'because of purchases at excessive prices' and its credit is seriously impaired. It is clear that the consumer will suffer both as to rates and service." He will suffer because "the credit of all but the most exceptional operating company must stand or fall with that of the company which controls its destinies and provides a market for its securities. . . . And since the ease or difficulty of securing capital is an important consideration in fixing the rate of return to which the company is entitled, it would probably be incumbent upon the commission, both as a matter of law and as a matter of statesmanship, to grant an increase."

Events subsequent to 1928, when the discussion I have just read was written, seem to me to confirm the conclusion that the holding company directly and materially affects the interests of consumers and operating company investors. From this it follows, in my judgment, that the holding company, regardless of whether it is a public utility in the constitutional sense, is affected with a public interest in an economic and governmental sense, and that it should therefore be subject to a measure of control by the state.

How should such state holding company regulation be effected? The states might, by statute, attempt to confer jurisdiction over holding companies as such upon their commissions, and those commissions might conceivably seek to regulate the affairs of these holding companies. But the feasible way, and in my judgment the appropriate method, follows another course.

The state should not attempt, certainly at the present time, to regulate holding companies directly. It is my judgment, however, that no system of state regulation of operating companies is complete or adequate, nor can it furnish any genuine protection to consumers and investors, unless the commissions are given ample authority over every transaction between the operating company and the holding company.

It seems to me important to draw a distinction between these two methods. To assume jurisdiction directly over the holding company is a complete innovation. On the other hand, regulation of all transactions between the operating and the holding company in any way affecting the public interest is simply an extension, and in my judgment a logical extension, of powers already vested in the state commissions. In the exercise of such powers they have experience and a background. Furthermore (and this I regard as fundamental) such state regulation of these transactions with affiliates proceeds from the foundation of local conditions upward rather than from the superstructure downward, a defect inherent in federal regulation of operating companies. Regulation cannot be realistic unless it is shot through with the color and the tone of the city, the village or the countryside where the consumer lives.

A state commission armed with such a statute as Wisconsin and a few other states have should be able to protect the consuming public against three kinds of abuses which some holding companies have been practicing: First, abuses growing out of what I have termed "banking transactions" with the holding company; second, abuses by way of the payment to the holding company of common dividends in excess of those which conservative business judgment would permit, at the expense of adequate provision for depreciation and surplus account, and, third, abuses through the medium of unnecessary or unreasonable management and supply contracts. Since we now know that these abuses have actually existed and in some quarters still continue I may be excused for commenting briefly upon each of these types of danger to the well-being of the operating company.

As to "banking transactions," it seems to me here lies the state commission's greatest duty of vigilance. The specific cases which I submitted earlier in this discussion, and many others with which we are all familiar, attest to this. Advances to the holding company, "up-stream" financial transactions of all kinds are so fraught with danger that although there are situations in which they are justified, they should in my judgment be frowned upon by utility executives and regulators alike, in all but very exceptional circumstances.

A situation very much in point came to light just the other day. It appeared that a local utility, having less than four millions total property and plant, had loaned its holding company more than one and a half millions in the course of less than

two years. It is not surprising to find that the local company is today unable to meet a maturity of one and a half million and is asking commission authority to issue additional bonds and notes to avert a receivership. Most of the defaulted securities are in the hands of savings banks and charities. Think, for a moment, of the effect of this single incident upon institutional investors in operating utility securities! A vigilant state commission armed with the necessary powers could have warded off this blow to utility credit in that commonwealth. Even though from some quarters such action would have been greeted with the charge of "politics" or "radicalism," the commissioners would have had the satisfaction of knowing that they had met their responsibilities.

As to payment of dividends at the expense of provision for depreciation or retirements and an adequate cushion by way of surplus, I believe you will agree that there can be no distinction between the financial practices which should prevail in an independently owned public utility and those where the common stock is owned by a holding company which embraces a number of operating companies. If the condition of an operating subsidiary is such that wise and conservative financial policy would dictate the building up of more adequate reserves for depreciation, or preserving the cash position of the company at a time when borrowing is difficult, or the writing off of abandoned property over a reasonable period, or amortizing of bond discount or organization expenses, or building up surplus—wherever these matters would be handled in a certain way by a prudent independent board of directors, then the fact that the board of directors is not independent, but is controlled by and acts for a holding company, should in no way affect the kind of judgment which the board should exercise.

This has not been the case in a considerable number of situations. I am not suggesting, of course, that the common-stock holder is not entitled to receive his dividend if it is earned, and sound business justifies its payment, and whether the stockholder is a holding company or a "widow or orphan" cuts no figure. But the records of a number of operating subsidiaries show that dividends were paid by a board of directors controlled by a holding company which would not have been paid by independent directors, or would not have been paid in so large an amount at the particular time, had the company not been under pressure to transmit cash to the holding company.

It is this situation which the executives of holding companies should watch with the greatest care lest public opinion be aroused against all holding companies, without discriminating between those concerned for the interests of the public investor and those which disregard those interests and use this quasi-public business as a speculative device.

Here is responsibility which rests first of all upon the management. But if the management fails to act, then it becomes the plain duty of the state regulatory authorities to require it to act or to step in and prevent these unsound practices.

It is urged that such action by the state commissions, even though constructive in a particular situation, will injure the credit standing of the holding companies generally, and thus result in more harm to the public interest than good. But can this be a sound justification for freedom from governmental supervision, where the particular facts call for such intervention?

The collapse of a colossal holding company last April has done more harm to the repute of holding companies and to public utility credit in the eyes of investors than all the orders and investigations of commissions put together. In this one debacle thousands of investors lost millions upon millions of dollars as the harvest of practices which has put even well-managed and conservative holding companies under an undeserved cloud. This is the record of an unregulated business. In the same period not one large operating utility rendering electric, gas or telephone service has failed or defaulted. The securities of well-managed operating public utilities are the one bright spot in the gloomy investment picture at this hour. This is the record of a regulated business.

No public agency has existed to prevent holding company inflation and overcapitalization in the boom years, and only a few companies have thus far seen the present necessity for a courageous scaling down of what has often been a too-generous capital structure. Having no power over holding company capitalization, may it not be said that the state commissions have no corresponding responsibility to see that operating company common-stock dividends are available to support the holding company capital structure? The state commission's responsibility is to the investors in operating company securities, including common-stock holders, in the order of their seniority, and to the consumers of operating companies. In meeting this obligation it may be necessary to take steps adverse to the holding company's interest in withdrawing earnings from the operating company, but should that consequence alone deter a state commission from protecting the credit of the operating company and the interests of the rate-payers? I submit that it should not. We must not forget that the principal benefit to the operating company which it was said that the holding company could confer was an advantage in financing. To permit the holding company, in a time of financial stress, to lean upon the credit of the operating company is a policy which in my judgment should be disapproved of by the leaders in the industry, by investors and, beyond any question, by the state commissions.

As to abuses through the medium of unreasonable or unnecessary management and supply contracts, the Wisconsin statute requires a showing of cost to the holding company of the managerial services rendered, and this practice is becoming common. Assuming costs are shown, should a commission permit a margin over cost; should there be any profit? The question is one which will undoubtedly be heard time and again in the next few years. There appears to be a tendency among the companies voluntarily to take the position that no profit should be made and to put these contracts on a genuine cost basis; in the case of some companies apparently that has always been the practice.

It is too clear for argument that management services should not be supplied through the holding company unless there is a clear and unmistakable need. It seems a sound managerial policy and clearly a sound regulatory policy to insist that a centralized agency should not render services to a local property unless it is certain the

local property cannot do the work equally well itself.

As we all know, there are among the executives of the public utility holding companies some of the ablest and most public-spirited business men to be found in all the ranks of industry. They have conducted the affairs of their companies, both through the gaudy years of the boom and the dark days of this depression, with conservatism and integrity. Some of these men, in discussing the present situation with me, have said, in substance: "We have not been guilty of slippery financial practices and over-reaching, and we condemn them as heartily as you or any one else possibly can. But the investing and the voting public are not inclined to discriminate between the bad holding companies and the good holding companies. This is grossly unfair. It injures the repute and the credit standing of those of us who have carried our responsibilities faithfully."

It *is* unfair. And it seems clear to me that regulatory authorities should be just as quick to commend and defend those executives who have demonstrated their concern for the public interest as they are to condemn and to outlaw the pirates of utility finance.

But what is more important is to guard against a repetition in the future. Is intelligent public regulation necessary to protect the conservative from the disrepute brought upon them by the excesses of the plungers? Is it reasonable to expect the holding companies voluntarily to impose standards of practice, to be self-enforced, a kind of code of business ethics? The events of the past six months have made these questions far from academic, and it is heartening to know that they are being earnestly discussed in high places.

The current depression brings again to the fore the question of the business wisdom of organizations of the size which were built up during the period of expansion. Are men wise enough and strong enough so that they can efficiently and effectively control and operate systems of such great magnitude? Do organizations of such size involve too great a strain upon human wisdom and human capacity, and result in losses and inefficiency which would not appear in smaller organizations? In other words, are we paying too great a price for size?

Not a few business men today are asking these questions and renewing doubts about the efficiency of great size. This doubt concerning the virtue of size will not be dismissed without the serious consideration of every one in any way connected with the public utility industry. All of us here know that some of the public utility systems which have been built up have collapsed for one reason or another, or a combination of reasons. Whether this collapse was due to the inherent weakness of the particular structures, of bad financial practices, of over-reaching, of lack of capacity or integrity in the management, or because of the inherent limitations of size, I am certainly not prepared to answer, and I doubt if any one at this moment is sufficiently acquainted with the situation to answer with any assurance.

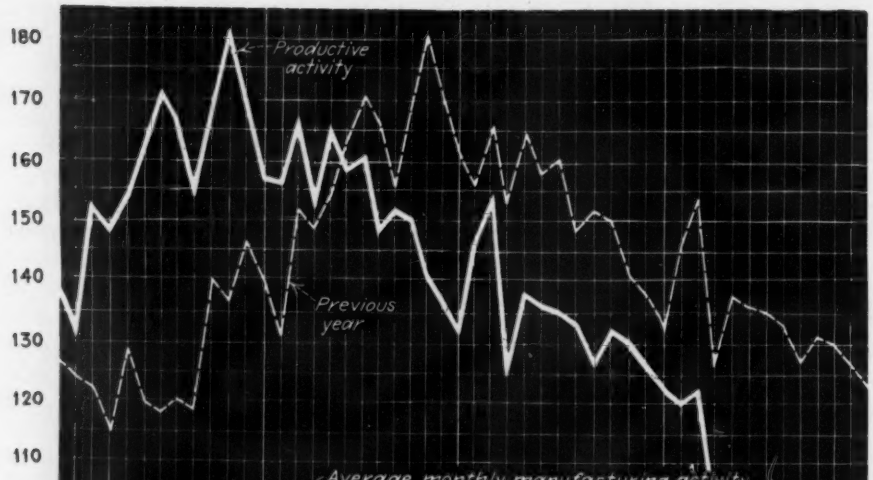
This whole question of size and of the public policy involved in great consolidations of properties raises a further, and final, question. Assuming centralization may produce economies which cannot be effected in any other way, this much, in my judgment, is true: That there is a social loss to the community and a loss in the quality of a utility's public relations whenever we have long-distance management of matters which could be adequately handled by local managers. Take it from the point of view of regulatory authorities. Here is utility "A" with property aggregating, let us say, $100,000,000, operating over an extensive area. It has a system management and district managers. The resident manager in charge of the property was born and educated in the state; he knows intimately both the physical lay-out of his system and the character of the population in each of the communities served. He knows thousands of individuals throughout his territory and has had numerous contacts with them. He knows the climatic and topographical conditions of the state thoroughly. He is in constant touch with regulatory authorities on matters of rates, service and financial practices. Is it sound policy to deprive such a man of authority to make not only minor decisions which lie between his company and regulatory authorities, but major decisions as well? Certainly, from the point of view of state authorities, it is both discouraging and irritating to find, as one so often does, that such a man has not much more authority in such matters than the office boy. Of course, there are many questions which require special knowledge and information, and on these I concede that he should be advised and even directed as to his duties by the holding company. But for one problem of this kind I venture to say that there are at least a score upon which he should, in my judgment, make the ultimate decision.

The reasons are many. There is the resulting improvement in relations with regulatory authority, for regulation, like management, must proceed in the light of local conditions. Then, too, improvement in the standards of local managers is another reason. How can high standards of performance and high standards of responsibility be developed in any man who realizes that although he is thoroughly familiar with his situation he must secure the approval of a central authority not only to his major, but even to relatively minor decisions.

I believe I know the arguments which will be advanced against this suggestion. I have heard many times of the benefits of uniformity. I know of the superior capacity of a centralized agency on matters of engineering and rate practices. I know of the great contributions to the art of public utility operation, and consequently to the science, of public utility regulation which some of the great central agencies have made. I put all of these into the balance and weigh them according to the claims of their exponents, and still I insist that the intangible benefits which would accrue to public utility operation, utility relations with the public and the relations with regulatory authorities by giving a much greater degree of local autonomy to the managers of operating subsidiaries outweigh the advantages which the proponents of highly centralized management can suggest. A few of our holding companies have already demonstrated that just such a compromise between complete integration and complete decentralization is feasible.

A good many of you have viewed with disapproval the proposals that the federal government engage in the regulation of electric and gas rates. I urge you that if the problem is a local one as regards regulatory authority, for similar reasons it is a local one as regards managerial authority. If it is a wise practice to decentralize regulation, is it not to that extent a wise practice to decentralize management?

Rebound in Electrical Manufacturing



After sinking to the lowest point in years, activity in electrical manufacturing rose sharply in September. Reports of energy consumption in this industry indicate an increase over August of 20 per cent in the rate of production, when the difference in the number of working days is taken into consideration. Compared with 1931 operations are down 39 per cent.

Monthly Index of Electrical Manufacturing Activity

Adjusted to 26 working days
Base: Average Month, 1923-1925

Month	1929	1930	1931	1932
January.....	131.3	156.2	146.6	120.0
February.....	151.8	165.2	154.3	122.2
March.....	148.3	153.0	126.1	102.9
April.....	154.6	164.9	138.1	95.6
May.....	163.5	158.0	136.7	92.8
June.....	170.5	160.2	135.2	83.1
July.....	166.6	148.5	133.4	79.2
August.....	155.4	152.2	126.9	67.6
September....	168.8	150.0	132.6	81.4
October.....	180.6	140.6	130.4	.....
November....	169.5	137.5	126.9	.....
December....	157.0	132.4	123.5	.....

The September rise was part of a widespread advance registered by many industries. Electrical manufacturing increased both in the Middle Atlantic and Central States, but decreased in New England. Industrial equipment as well as appliances seem to have been involved. Smaller concerns on the whole moved up more than the large ones.

Strong Gains in South; Western Industries Also Rise

Further pronounced increase in industrial activity in the South is indicated by September returns on energy consumption received by the ELECTRICAL WORLD. The weighted index registered the extraordinary gain of 23 per cent over August, after an upward revision of the latter for delayed returns. This brings current activity within 5 per cent of last year's at the same season.

Chemicals, foods, iron and steel, forest products, paper and pulp, textiles and the stone, clay and glass group all made pronounced gains. While the computed indices take into account the fact that September contained fewer working days than August it is worth noting that actual energy consumption, even without that adjustment, increased sharply in many of the reporting plants.

Particular interest attaches to the progressive advances in the two groups serving the construction industries, namely, iron and steel and stone products. In the latter group cement-making plants are the chief constituent. Food products are virtually up to the 1931 level, the September index last year being much above that for other months.

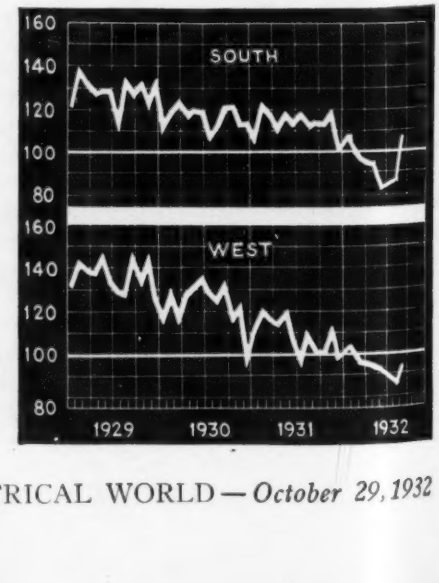
Western gains were less pronounced, though in that territory also some advance is indicated by the rise of 6 per cent in the average, in contrast with a recession of 4 per cent from August to September last year. Even the metals group, though it remains abnormally low, has been manifesting an upward trend. Chief gains were in forest products and in paper and pulp.

Indices of Industrial Activity in South and West

Base: Average Month, 1923-1925 = 100

	South					West				
Industrial Groups....	Sept., 1932	Aug., 1932	July, 1932	June, 1932	Sept., 1931	Sept., 1932	Aug., 1932	July, 1932	June, 1932	Sept., 1931
All Industry.....	**108.5**	**87.9***	**85.3**	**83.7**	**113.8**	**96.0**	**89.4***	**88.7**	**91.6**	**102.3**
Chemicals.....	144.0	120.8*	122.2	124.8	156.6	84.2	85.3*	88.7	85.2	78.1
Food.....	171.6	153.7	157.5	144.8	201.6	120.0	113.6*	112.5	112.4	134.5
Iron and steel.....	107.1	79.0	73.7	60.7	153.4	.....	.....	.....	.....	.....
Metal working plants...	60.5	62.8	61.3	59.2	82.7	.....	.....	.....	.....	.....
Metals group.....	86.7	72.0	68.2	60.1	122.2	38.4	35.6*	31.7	43.8	43.4
Forest products.....	44.1	33.7	31.6	29.7	64.6	121.2	104.8*	103.8	106.3	129.0
Paper and pulp.....	142.2	114.1*	119.0	117.5	137.8	135.4	126.7*	120.0	128.7	137.3*
Rubber products.....	86.8	88.9	104.5	168.8	91.4	84.5	92.8	103.0	132.0	115.1
Shipbuilding.....	.....	.....	.....	.....	.....	108.0	96.5*	103.3	105.0	96.2
Stone, clay and glass...	143.2	103.2	95.7	110.0	138.7	81.3	82.0*	79.3	72.0	93.9
Textiles.....	105.3	81.2	71.2	75.2	104.3	.....	.....	.....	.....	.....

*Revision.



Correlate Diesel Energy Costs on Performance Economies

By M. J. REED
Secretary Diesel Engine Manufacturers' Association, New York

THERE are few subjects so little understood as Diesel plant energy costs. Moreover, this lack of understanding exists in the face of a large body of data sufficient to determine all but the most controversial points. The British Diesel Engine Users' Association has been collecting Diesel engine costs for almost ten years; the American Society of Mechanical Engineers has been conducting a study for four years. The mass of facts which has accumulated is indeed formidable. The difficulty, it seems, lies in the interpretation. In the July 9 issue of the ELECTRICAL WORLD an interpretation of Diesel cost data is made which, although no doubt well intentioned, falls into several fundamental errors.

Attention is called in this article to the "gunshot" manifestation in Diesel plant cost—meaning total operating costs. This tendency is represented as regrettable; on the other hand, it is entirely normal and to be expected. Total operating cost is the composite of several factors, some of which vary considerably with plant location. It is just as reasonable to expect the price of any commodity to remain within narrow limits all the way from Maine to California as to expect Diesel plant operating costs to hold closely to averages.

What this article overlooks is that the fundamentals of Diesel operating economy do conform quite closely to graphical medians. By the fundamentals of operating economy are meant the following:

1. Fuel economy in kilowatt-hours per gallon of fuel as plotted against "running plant capacity factor."
2. Lubrication economy in kilowatt-hours per gallon of lubricants as plotted against "running plant capacity factor."
3. Basic attendance in kilowatt-hours per man-hour.
4. Supply, repair and miscellaneous cost in mills per kilowatt-hour plotted against kilowatt-hours per year per kilowatt installed.

It is only necessary to point to Figs. 1 and 2 of the A.S.M.E. report referred to (or to the more recent report available June 10 of this year) to show that Diesel fuel and lubrication economy can be rationalized between fairly narrow limits. It is true that there is quite some variation in lubrication economy, but that is to be expected in view of the fact that this is influenced not only by the type, size, age and condition of the engine but also by the price and grade of oil used, the arrangements for purifying this and by the management of the operator.

Fuel costs subject to wide variation

The fact that data applying to every type of engine, and for sizes from 50 to 3,750 hp., and for engines ranging from new to 27 years old conform so well as to *economy* of fuel and lubricating oil indicates that there is a very marked tendency in that direction. The very conformity, on the other hand, promotes a decided non-conformity in fuel and lubrication *cost*, prices for fuel and lubricating oil varying so greatly as they do depending upon grade and distance from producing and refining centers.

Another reason for correlating economies rather than costs in dealing with fuel performance lies in the shifting fuel oil market. While fuel prices swing no wider than prices of many other commodities, there is variation from year to year. This is obvious from the statement "one plant reported paying as high as 9 cents for its fuel oil and another as low as 3.5 cents." Had the most recent available A.S.M.E. report been used, these limits would have been 7.79 and 0.95 cents respectively. Thus economy data are of more permanence than cost data. It is true that there is not much uniformity in attendance ratios. However, much of the variation is needless in that many plants are overmanned, or have perhaps too many inferior attendants rather than fewer but better men. Even so, there will be *less* conformity in attendance *costs* because of the added variation in wage scales depending upon location.

Repair costs do not increase with rating

Although geography plays a part also in repair, supply and miscellaneous cost, the influence of location is not marked as it is in the case of fuel cost. If supply, repair and miscellaneous costs in mills per net kilowatt-hour be plotted against net kilowatt-hours per year per kilowatt installed a very definite relation will be discovered. It is not feasible to go into details here, but such a treatment when applied to all the costs reported in the A.S.M.E. reports for 1929, 1930 and 1931 discloses that such costs are not influenced by the size of the installation. This point illustrates rather forcibly the undesirability of using the approach of the July 9 article. The analysis employed there makes it essential that all plants retained for study be reported upon in full detail. Accordingly only eighteen plants out of a total of 94 can be used. The data on these eighteen plants are said to indicate that repair, supply and miscellaneous costs increase as the size of the plant increases. When Diesel plant costs are investigated by subdivisions, all the data applying to each subdivision can be utilized. It is possible to apply the data for over 250 plant years to the repair, supply and miscellaneous cost question, and these data show that eighteen plant years, selected because they happen to fit the case in other directions, present a misleading view. Similarly the data on 62 plants in the 1930 report (90 in the 1931 report) can be applied to the study of fuel oil and lubricating oil economy.

It is time that something be said about the figures taken from the book "Recent Economic Changes in the United States," which has been quoted rather widely in a misleading manner. These figures have been used

to attempt to prove that Diesel engines installed in industrial plants should be amortized within a five-year period. There should be no misunderstanding in this connection. This book is very well divided up by subheadings and paragraph headings. The discussion of amortizing period very definitely refers to manufacturing machinery, which, in this book, is distinctly separated from power machinery. It is, of course, easy to see why industrial concerns prefer to amortize manufacturing machinery within five years. Manufacturing methods change rapidly. The refining of petroleum is said to go through a complete cycle once every five years. Doubtless many other similar illustrations could be produced. However, unless perpetual motion is in the offing, the manufacturing processes of tomorrow will still require power. For this reason, the application of fixed charges of the order of 26 per cent is simply ridiculous. An industrial concern should set up fixed charges for a Diesel plant on the basis of the expected economic life of that plant as a producer of power, and not on the life of a particular manufacturing process having no relation to the method of producing power.

The probable life of a Diesel engine is an undetermined matter. Diesel engines have been in general use for only about twenty years. It is established that the figure is at least that high, but it may be higher—time must tell. From experience with old engines, it is known that engines installed today will, with reasonable care, hold to their present efficiencies for at least twenty years to come. Naturally no one can say at what time the Diesel engine will become obsolete, just as a similar guess as to steam turbines would be hazardous. However, there is no present reason why a lesser period than fifteen years should be considered from an obsolescence standpoint. Central stations can and do assume an amortization period of from fifteen to twenty years, corresponding to fixed charges (with taxes and insurance at 3 per cent and interest at 6 per cent) of from 13.3 per cent to 11.72 per cent. Manufacturing companies not certain of staying in business for that length of time—and not merely of not being able to use a process for that length of time—may be inclined to use lesser amortizing periods—perhaps even as short as ten years.

The selection of the particular eighteen plants of the article in question seems to be dictated by the availability of the first cost data. The first costs presented by the 1930 and 1931 A.S.M.E. reports are the prices paid for plants when constructed. Considering that plants are included which were started as long ago as 1912, the worth of this data is doubtful. The A.S.M.E. subcommittee recognized this when it stated in the 1931 report: "Due to the difficulty in obtaining reliable information on expenditures over past years and to the fact that such data may not reflect current costs, the committee has decided to discontinue this feature of the investigation in the future." In other words, the first cost data for these eighteen plants is quite out of date because of improved manufacturing methods, improved designs and a falling market.

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Magnetic Noises Vary Greatly in Potency

Noise around electrical machines is due to the toothed magnetic structure causing periodic variations in the field, according to F. W. Carter, British Society for Advancement of Science. Certain harmonics in the periodic magnetic forces which act on the teeth are essential to the vibration. A comparison was made between two machines from the point of view of vibration and it was estimated that one had some eighty times the potency of the other in producing sound. The sound produced is not effectively broadcast unless the pulse of distortion which produces it travels around the machine with greater speed than that of sound in air.

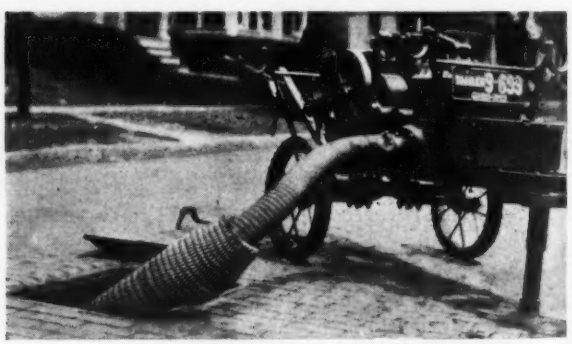
▼ ▼ ▼

Hose Protection for Manhole Pumps

By P. R. KNAPP

Superintendent Electric Distribution, Toledo Edison Company, Toledo, Ohio

Pumping water out of manholes is an operation common to all underground cable departments. Suction hose used on pumps is expensive. Pulsations in hose caused by variations in stream flow, due to reciprocating pump action, produce rapid wear on the hose at the edge of the manhole. It is not uncommon to wear out a new hose in a single day of pumping. The underground department of the Toledo Edison has solved this problem satisfactorily in a novel manner. One of the employees with a knowledge of "marlin spike seamanship" has instructed some of the men how to weave a "stocking" out of rope. This rope stocking is slipped over one end of the hose and placed at the position of contact between hose and edge of manhole, protecting the rubber hose from wear at the sharp edge of the metal manhole frame.



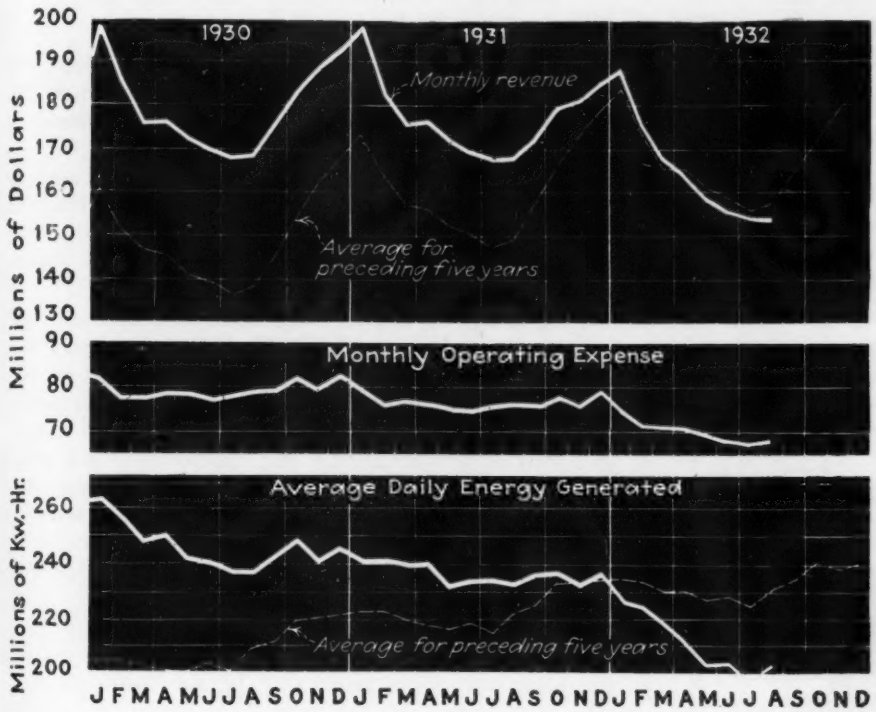
Rope stocking saves suction hose

Suction hose life has been prolonged indefinitely by the use of these rope stockings. Rope wrapping or serving was previously found to be of little value as the edge of the manhole frame would reach the rubber by wedge action between turns. These stockings are made by labor that would otherwise not be occupied at an average total cost, both labor and material, of $3. Ten months' service has been secured from the first one made and it is still in good condition, while its hose is unharmed

August Central-Station Revenue Slightly Under July

REVENUE for electric light and power usually shows little change in the two midsummer months. This year August returns indicate a slight decrease compared with July, but the amount does not seem large enough to be significant. The total for the industry, estimated at $152,020,000, is 9.3 per cent less than in the corresponding month of 1931. While the disparity is somewhat greater than it has been in recent months, this was to be anticipated in view of the changes that have been reported in energy output and the necessary time-lag between consumption and payment.

On the same basis it is to be anticipated that September revenue reports will show a relative improvement, since production in August, 6,303,229,000 kw.-hr., not only exceeded that of July by 3 per cent but approached closer than in July to last year's figures. The disparity in August was 12.0 per cent, against 15.7 in July, 12.6 in June and 13.5 in May.


1930
1931
1932
Monthly revenue
Average for preceding five years
Millions of Dollars
Monthly Operating Expense
Average Daily Energy Generated
Millions of Kw.-Hr.
Average for preceding five years
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

Operating expenses decreased from 1931 in about the same ratio as revenue, 9.5 per cent, to $68,370,000. Part of this decrease was no doubt due to the changed balance between hydro and fuel-generated power. The former was 5.4 per cent more than last year, the latter 20 per cent less. Nearly 38 per cent of the total production came from water power. A year ago it was less than 32 per cent.

In the several geographical regions the revenue compares with that in 1931 very nearly as it did in July; all are below last year's operations, but in different degree. New England is closest, down 6.5 per cent; the East North Central area remains down 11 per cent. The Southwest and Mountain states show some relative gains, while the Middle Atlantic area has fallen back somewhat.

As to energy production, the decrease from last year continues, though the difference has become smaller in eight geographical regions and in the remaining one, the East South Central, which had a July output 2.4 per cent larger than last year, the gain has increased to 3.8 per cent. It should be stated that consumption in the last-named area remains less than in 1931; the larger output of central-station plants was more than balanced by smaller purchases from certain large water-power plants not classed under electric light and power. Hydro output in most sections was larger than last year.

Table I—Energy Output of Central Stations in the United States

Compared with Corresponding Month of Previous Year

Month 1932	Generated, Thousands of Kw.-Hr.*						Purchased for Resale	
	Total		Hydro		Fuel			
	Generated	Per Cent Inc.	Generated	Per Cent Inc.	Generated	Per Cent Inc.	Thous. Kw.-Hr.	Per Cent Inc.
May	6,215,698	—13.5	2,842,028	— 4.0	3,373,670	—20.5	1,668,000	—10.5
June	6,133,468	—12.6	2,500,204	— 5.2	3,633,264	—17.2	1,643,000	— 9.7
July	6,102,481	—15.7	2,495,937	— 0.3	3,606,544	—24.2	1,714,000	—10.0
August	6,303,229	—12.0	2,385,220	+ 5.4	3,918,009	—20.0	1,840,000	— 1.2

Table II—Regional Operation, Revenue, Energy Output, in August, 1932

Compared with Corresponding Month of Previous Year

Region	Revenue		Energy Generated, Thousands of Kw.-Hr.*					
			Total		Hydro		Fuel	
	Thousands of Dollars	Per Cent Inc.	Generated	Per Cent Inc.	Generated	Per Cent Inc.	Generated	Per Cent Inc.
United States	152,020	— 9.3	6,303,229	—12.0	2,385,220	+ 5.4	3,918,009	—20.0
New England	15,830	— 6.5	416,158	—13.0	172,371	+ 6.5	243,787	—23.1
Middle Atlantic	38,510	— 8.9	1,590,430	— 7.8	391,729	+ 1.4	1,198,701	—10.7
East North Central	34,870	—11.1	1,384,221	—15.2	112,798	+14.8	1,271,423	—17.1
West North Central	13,140	— 8.7	443,611	— 6.8	103,517	+23.0	340,094	—13.2
South Atlantic	17,060	— 7.5	675,464	—16.1	325,247	—19.3	350,217	—13.0
East South Central	5,020	—13.0	284,061	+ 3.8	236,762	+ 9.5	47,299	—17.6
West South Central	8,550	— 7.8	365,393	—10.6	9,452	+97.2	355,941	—11.7
Mountain	3,660	—11.7	202,354	—22.3	161,383	—23.2	40,971	—19.2
Pacific	15,380	— 9.8	941,537	—14.3	871,961	+24.7	69,576	—83.3

*By courtesy of U. S. Geological Survey, with deductions for operations not regarded as central-station operations.

Table III—Central-Station Financial Operations in the United States

Compared with Corresponding Month of Previous Year

Month	Total Gross Revenue from Sale of Energy*		Total Operating and Maintenance Expense†	
	1932 Thousands	Per Cent Inc.	1932 Thousands	Per Cent Inc.
May	$158,300	— 7.7	$68,070	— 8.7
June	154,960	— 8.0	67,510	— 9.3
July	152,370	— 8.9	66,410	—11.6
August	152,020	— 9.3	68,370	— 9.5

*Aggregate gross revenue from consumers and from other utilities for energy for resale, involving a certain amount of duplication.

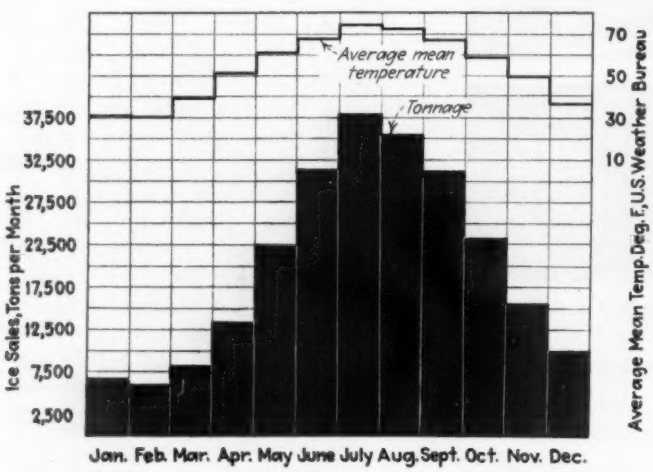
†Does not include interest, taxes, depreciation or sinking fund, with some unavoidable exceptions.

Ice for Air Conditioning

By EUSTACE C. SOARES
Treasurer R. B. Engineering Corporation, New York

Best for short-time loads or rapidly fluctuating loads.
Utility sales to ice manufacturers offers splendid load.
Suggestions as to energy required.

WHERE ice is used for serving such peak-load business as air conditioning the ice plant serves as a storage battery between the central-station lines and the user of air-conditioning equipment utilizing ice as a refrigerant. During 1931 it is conservatively estimated that about 2,500,000,000 kw.-hr. were purchased in the United States for the manufacture of ice. The great bulk of this power is sold at very high load factor during the summer months and the power factor of the load is close to unity. The air-conditioning load served directly by electric power shows a very poor load factor in the great majority of cases. The accompanying ice sales chart is representative of the air-conditioning load.



Ice sales indicate load factor for air conditioning

Those ice plants advocating cheap ice for air conditioning manufacture their product for less than 50 kw.-hr. per ton. If this ice is used in air conditioning the power expended in melting it is very small and does not approach anywhere near 30 kw.-hr. per ton of ice, as has been indicated at times. The correct figure is not more than 5 kw.-hr. per ton of ice. Perhaps some of the confusion regarding the amount of kilowatt-hours used to melt a ton of ice is owing to the fact that the power used by the air blower is included. This power for the air blower is a part of the ventilating system and appears whether or not ice is used as a refrigerating medium.

The benefits that will accrue to the central-station company through the use of ice for air conditioning will be manifold. In the use of ice the first cost of such systems is low and averages from 25 to 30 per cent of the cost of mechanical installations. A greater use of air conditioning thus will be possible through widening the market. Large markets exist in the air cooling and conditioning fields. Ice distribution cost for that field instead of averaging between two and three times the cost of the manufactured product drops to about one-half the cost.

Operating costs are lower with ice when cognizance is taken of the fact, in comparing costs, that fixed charges must be divided over a comparatively few hours of usage each year and that water cost in the mechanical system is a serious item of expense.

In comparing ice with a mechanical system the error is frequently made in confusing a ton of refrigeration (a rate) with a ton of ice (a capacity). A ton of ice represents approximately 26.5 ton-hours of refrigeration, having the refrigerating rate in one hour of usage of 26.5 tons of refrigeration. Air conditioning is a very intermittent load, extremely fluctuating, following the weather changes closely throughout the day and season.

Typical operating division statistics of an ice company for the year 1931 are shown in the accompanying illustration. The ice company operates in a metropolitan section of New England. The curves are very interesting, inasmuch as they also approximate the load factor of the air-conditioning business. In the four summer months represented by the curves the electrical power demand to serve this load varied about 10 per cent, while maintaining a power load factor of 94 per cent and a power factor of close to unity. Despite wide variations in sales from day to day the average production per day per month does not fluctuate 10 per cent. This is possible in all ice manufacturing plants through the discriminate use of storage facilities. It is also well to note that sales are reflected by the average daily dry bulb temperatures, but not exactly, because consumers have on an average storage facilities that make Tuesdays, Thursdays and Sundays unnecessary icing days. Since sales have a direct relation to average temperatures, the refrigeration load on an air-cooling plant varies similarly with temperature changes, complicated, somewhat, by wet bulb variations outdoors and occupancy load. As a whole, however, the electric load on an air-cooling plant fluctuates directly with the ever-changing wet and dry bulb temperatures.

An electric refrigerator is a load having a great diversity factor and high hours of usage. An air-conditioning plant demands refrigeration quite intermittently and has no diversification, since we meet every refrigeration load by a direct pull on the power lines to meet the load. All the air-conditioning plants on a line pull together and virtually all drop off together, the same day, week and hour. The hours' usage of air-conditioning systems varies broadly between 600 and 1,000 per

year, with only a few hours per day and at a varying refrigeration demand.

It is not intended to convey the impression that ice alone is always the correct answer for air-conditioning problems, for such is not the case. Ice serves most economically for those installations where cooling is of short duration and is extremely fluctuating. These conditions apply to the majority of jobs. On the other hand, mechanical refrigeration fits best on those jobs where loads continue over long periods of time and is usually found in industrial applications of air conditioning.

Ice thus has six definite advantages when applied to air-cooling problems:

1. It is readily available in all localities or can be manufactured by present existing refrigerating equipment.
2. It possesses the merit of being able to yield any reasonable refrigerating rate, irrespective of its bulk, through the simple means of varying the rate of melting.
3. Its melting rate is independent of its production rate.
4. It represents in its bulk the storage of transformed energy available on demand at all times.
5. It has a constant temperature of 32 deg. F.
6. Power is sold for ice making at extremely high load factor as well as high power factor.

The problem facing the central-station company today is that of reducing high distribution costs. It hardly seems relevant to seek high demand loads of very small load factor with the view of reducing distribution costs. Ice plants, on the contrary, utilize primary power at load factors second to no other industry. The demand during the four summer months varies on an average less than 10 per cent. The ice plant operating 24 hours per day, every day of the month, represents the storage of electrical energy. The melting rate of ice, whether it be at 25 tons an hour rate or a 1-ton hour rate, reflects no influence on the utility plant. Ice plants are storage batteries on the lines of a central-station company. Ice thus permits the central-station company to serve air-conditioning installations through the ice industry as a flywheel.

▼ ▼ ▼

Trip-Circuit Supervision With Four Wires

By WALTER B. MORTON*
Project Engineer Philadelphia Electric Company

The primary function of a circuit breaker control system is to close and open the breaker and to show, by means of lamps at the switchboard, an indication of the position of the breaker contacts, whether open or closed. Such a system is shown in Fig. 1, in which a separate wire is required for each of the four functions closing, opening (or tripping) and red and green position indicating lamps. Fig. 2 is similar except for the elimination of one conductor obtained by utilizing a common return wire for both lamp indications.

In this circuit no supervision, or indication of the continuity of the tripping circuit, other than the trip coil pallet switch is provided. Some degree of trip coil supervision appears desirable in any control circuit where assurance of the ability of the breaker to open under distress is of greater importance than protection against accidental tripping due to short circuit of an indicating lamp, a potential possibility in any supervisory scheme. Partial supervision may be obtained by making connection to the red and green light equipment, as shown in Fig. 3.

This circuit uses only two wires and provides for red and green lamp supervision of the trip coil and its associated pallet switch.

Complete supervision of the tripping circuit, including relay contacts and pallet switches, may be obtained by using a four-wire circuit, Fig. 4. A faulty or open contact at any point in the tripping circuit furnishes an indication by blinking or extinguishing the red lamp. Such complete supervision is not generally considered necessary in view of the reliability of present-day equipment, and any advantages gained are at least partly offset by the resulting additional complications in switchboard wiring.

The method of d.c. supply used is assumed in each scheme as the "loop" system, in which common d.c. supply buses are looped between breakers, as distinguished from the elaborate and expensive "radial feeder" system in which a separate d.c. supply feeder is included in each individual breaker control circuit.

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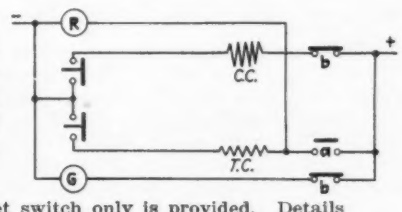


Fig. 1—Conventional four-wire control circuit using separate wires for red and green lamp indications

Supervision of pallet switch only is provided. Details of trip-free relay connections are omitted for clarity.

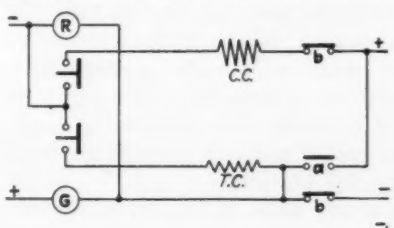


Fig. 2—Modification of conventional control circuit

Combines red and green-lamp functions on common return wire

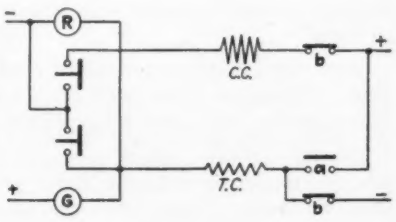


Fig. 3 — Two-wire control with switch supervision over trip coil and pallet switch

Both red and green lamps supervise trip coil. Red lamp also supervises pallet switch.

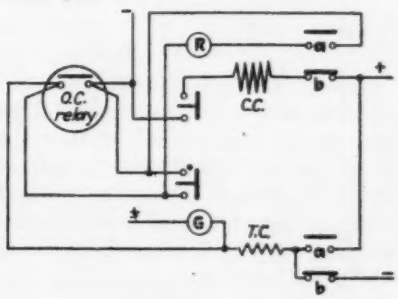


Fig. 4 — Four-wire control with supervision of tripping circuit including relay contacts, pallet switch and trip coil

Red lamp supervises all; green lamp supervises only trip coil.

How to Build Revenue With Small Heating Units

By W. V. MERRIHUE
General Electric Company

Small electric heating units and devices

Observe sample kit used by salesmen in showing industrialists versatility of applications. Up to August, 125 of these kits have been put in use by utilities—one in Italy—and more utilities are adopting it every day. Hardly a week passes that some representative of a utility does not arrive in Pittsfield for two or three days training in sales of these midget heating units.

THE ideal central station load-building activity, for the present at least, is one that will enable the power company to pick up small increments of load all over its lines. Such an activity is made thoroughly practical and easy of accomplishment by a load-building plan worked out by the General Electric Company and entitled "How to Build Your Load With Small Electric Heating Units and Devices."

For many years the small units of industrial electric-heating equipment, such as strip heaters, cartridge units, liquid-heating units, soldering irons, glue pots, etc., have fought for a place in the annual load-building plans of central stations. Invariably, however, they have been ignored or overlooked because they seemed to pale into insignificance compared to their bigger brothers of electric heat, such as induction and annealing furnaces, enameling ovens, etc., with their tempting loads that often ran up into the hundreds and thousands of kilowatts.

For a long time manufacturers of small electric heating units and devices had recognized the tremendous load-building possibilities inherent in this midget heating line and, by consistent sales promotion, were enabled to add hundreds of thousands of kilowatts to the lines of the nation's electric service companies. Three manufacturers have added more than 1,000,000 kw. in the last five years through the sale of these midgets. Despite this success, the manufacturers were seriously limited in the amount of sales promotion work that could be done on this line because of the small unit price of the equipment. On the other hand, it was believed that the central station could afford to push this equipment aggressively because of the recurring annual revenue from the load.

Accordingly, General Electric prepared a load-building plan built entirely around this line of midget heating units and divided the plan into two divisions: (1) Why the central station should sell or promote these units, and (2) how to sell or promote them.

In Part I were introduced the various members in the family of midgets and applications where they could be used. Next, it showed that the annual revenue from these midgets averaged from four to seven times the cost of the unit. It pointed out that the sale of one unit often started an avalanche of sales to a single plant (for example, the installation of one electric metal-melting unit in a Chicago industrial plant resulted in the sale of 216 similar units, a connected load of 457 kw. and an annual energy consumption of 1,000,000 kw.-hr.). Central stations were reminded that three manufacturers of these units had added more than 1,000,000 kw. connected load to the nation's lines simply by the sales of these midgets alone. This section concluded "reasons why" with a pertinent prophecy, "If we, the manufacturers, could do that, think of what you can do with the attractive load-building possibilities as an incentive."

Part II of the plan told how to sell the equipment by means of a complete, yet simple and inexpensive, merchandising plan. Briefly, the sales plan includes:

(1) A film slide for power salesmen suitable for projection in a pocket projector and entitled "Spots of Heat for Industrial Plants"; (2) a portable canvas sample kit containing all the most popular midgets in the family, as well as some of the control; (3) a mail order catalog listing all the midgets, their prices, ratings, dimensions, etc., suggested applications, instructions for installation, data for selecting the right unit for the job, and an order blank—in brief, a catalog designed to sell by mail by enabling the reader to select the unit he requires and then to order it; (4) a midget-heating unit survey card; (5) convenient midget heating-unit order blanks; (6) a direct-mail campaign.

Equipped with the first five of these sales tools, the power salesman visits each plant in his territory and goes through the following procedure:

(a) He collects a small audience of those men in the plant who are interested in heating jobs; for example, the plant engineer, electrician, maintenance engineer, handy man, etc.

Table I—Most Attractive Applications for Small Electric Heating Units and Devices

The following tabulations, taken from a General Electric booklet, show where the most immediate and profitable returns may be obtained, but it would be wiser to make a personal survey of each plant, possibly using a college student during the summer.

Key ★ Most attractive applications ● Good applications	Cartridge Units	Strip Heaters	Melting Units	Liquid-Heating Units	Melting Pots	Soldering Irons	Air Heaters	Electric Steam Generators	Miscellaneous Heating Units
Metal and non-metallic mines	..	★	..	..	●	●	★	..	..
Coal mines	..	★	..	..	●	●	★	..	..
Quarries	..	★	..	..	..	●	★	..	..
Petroleum and natural gas	..	★	..	●	..	●	★	..	..
Steam railroads	..	★	★	..	★	★	★	..	..
Electric railways	..	●	..	..	●	●	●	..	..
Telephone companies	..	●	●	..	●	★	●	..	●
Commercial buildings	..	..	..	..	..	..	★	..	●
Waterworks and sewage	..	★	..	..	..	..	★	..	..
Public buildings and structures	..	★	..	..	..	..	★	..	●
Construction companies	..	★	..	..	●	●	★	..	..
Acids, chemicals	★	★	●	●	★	●	★	★	..
Brick and clay products	●	★	..	..	..	..	★	..	★
Coke	..	★	..	..	..	..	★	..	..
Drugs, medicines, cosmetics	★	●	●	●	★	..	●	★	★
Explosives	..	★	..	..	..	..	★	★	●
Fertilizers	..	●	..	..	..	..	●	..	..
Glass	..	●	..	..	..	●	●	..	●
Leather	★	●	..	●	★	●	●	★	★
Lime, cement, stone, gravel	..	★	..	..	●	●	★	..	..
Oil, cottonseed and linseed	..	●	..	★	●	..	●	●	★
Paints and varnishes	..	●	..	●	●	..	●	★	..
Paper and wood pulp	..	●	..	..	..	●	●	●	●
Petroleum refining	..	●	..	●	..	..	●	..	●
Rubber goods	★	●	★	..	★	..	●	★	★
Soap	..	●	..	..	..	..	●	..	..
Sugar refining	..	●	..	..	..	..	●	..	..
Bakery products	..	●	..	●	..	..	●	●	●
Confectionery and ice cream	..	●	..	●	..	..	●	★	..
Canning and preserving	..	●	●	●	..	●	●	●	●
Dairy products	..	●	..	★	..	★	●	★	★
Flour, feed, grain	..	★	..	..	..	..	★	..	..
Slaughtering and meat packing	..	★	..	..	●	..	★	●	●
Steel	..	★	★	..	★	★	★	●	★
Machinery	★	★	★	★	★	★	★	★	★
Electric equipment and radio	★	★	★	★	★	★	★	★	★
Automotive	★	★	★	●	★	★	★	..	●
Cars and locomotives	..	★	★	●	★	★	★	..	..
Ship and boat building	..	★	..	●	★	★	★	..	..
Railroad repair shops	..	★	★	★	★	★	★	..	..
Metal products	..	★	★	★	★	★	★	..	..
Textiles	..	●	..	..	★	●	●	★	★
Logging camps and saw mills	..	★	..	..	●	●	★	..	★
Furniture and boxes	●	●	..	●	★	●	●	..	●
Paper products	★	●	..	..	●	..	●	..	●
Printing and publishing	★	★	★	●	★	..	●	★	★
Tobacco	●	★	..	●	●	..	..	..	●

(b) He retires with this little group to a suitable room, perhaps the foreman's office, where the shades can be drawn and a small area of blank wall space obtained.

(c) After a few preliminary remarks, he flashes the film slide on the wall and shows the film, "Spots of Heat for Industrial Plants," illustrating all the various types of midgets and many suggested applications.

(d) After the film has been shown, he opens up his sample kit and lets the men examine the units and ask questions about them. (Note—In many cases it is preferable to show the kit before the film in order to be able to use samples from the kit to illustrate points in the film more graphically.

(e) He now presents each man with a copy of the mail order catalog which lists the prices of the equipment seen in the film and sample kit.

(f) Then he gives each of the men a supply of order blanks made out to either the power company or an electrical manufacturer of the midgets to make it easier for the industrial prospect to order. He also explains how to fill in these order blanks.

(g) Finally, he fills out a survey card, with the aid of the men present, to record the present and potential uses for midgets in that particular plant. On this card he also places the names of the men present at the meeting.

As these individual presentations are made in all the important industrial plants on the line, the head office of the power company makes up a mailing list consisting of the names of all the men on the survey cards and to this list addresses a biweekly direct-mail campaign which continually suggests new applications for the midgets and continually reminds the prospects to refer to their mail order catalogs for prices. Thus the direct-mail campaign (much of which is furnished by the manufacturer) takes up the work after the power salesman has made the initial presentation. It is then necessary only for the power man to check up on his succeeding regular calls to see if the mail order catalog is being used whenever small industrial heating jobs come up.

Since the release of this plan, General Electric representatives have presented it in person before more than 150 central stations throughout the country. Success was immediate and continuous. A great many central stations are in full swing with all phases of the plan and many others have adopted it after certain modifications to suit local conditions.

The timeliness of the plan was especially appealing, coming as it did when new-business managers, power-sales managers and other executives were casting around for methods of obtaining a large number of small increments of highly desirable load.

However, we are fully aware that no matter how enthusiastically the plan is received, the big job remains to be done, and that is "the follow-up"—new sales ideas, new material, to be fed constantly to nourish the plan. It is earnestly hoped that this program of diligently seeking out business from installations of midgets will be adopted as a permanent activity by the power sales divisions, just as the promotion of electrical appliances has been made a permanent year-round activity by the commercial divisions.

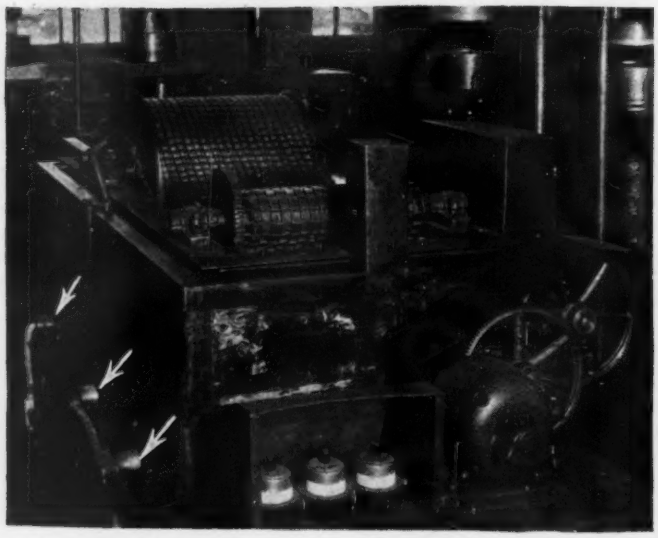
This program of going after the small increments of heating load is not a "depression plan." It merits just as much, if not far more, support in boom periods because these little increments of load, like "little drops of water, little grains of sand," not only add up to huge totals but the installation of a small and highly successful electric-heating unit usually educates its user to the point where he wants electric heat for larger process units.

This was pointed out in a report of the industrial heating committee of N.E.L.A. which says:

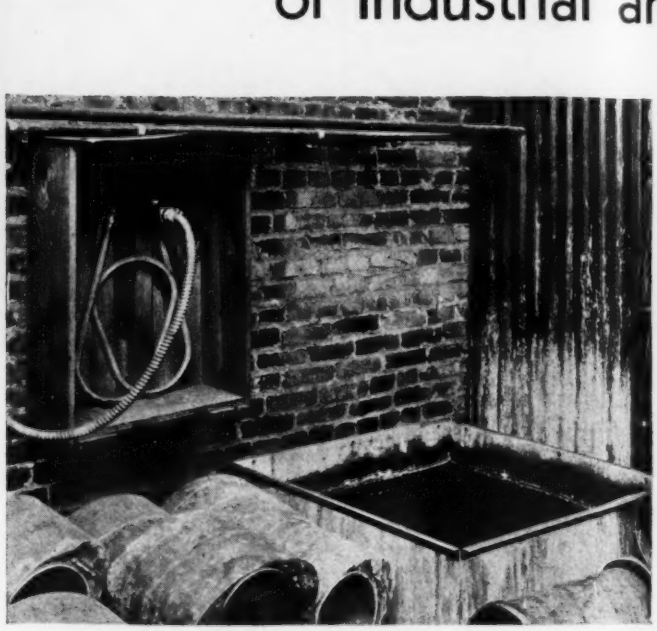
"Campaigns on small standard units, such as gluepots, solder pots, soldering irons, space heaters, etc., have educational value as well as load-building value, in that the customer becomes somewhat familiar with and accustomed to the use of electric heat and is then more susceptible to sales effort on larger installations."

In closing, we wish to pay tribute to Alex Dow, president of the Detroit Edison Company, for his following

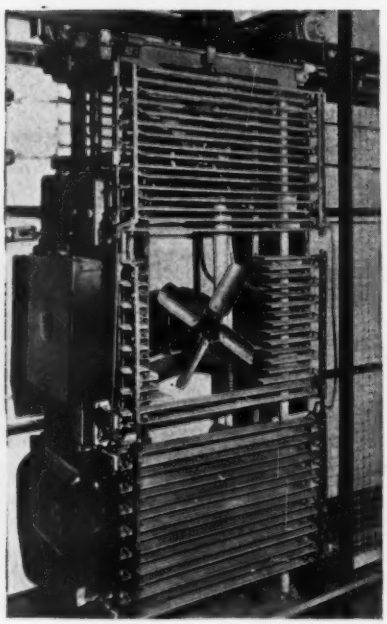
Electric Heat M
of Industrial and Co



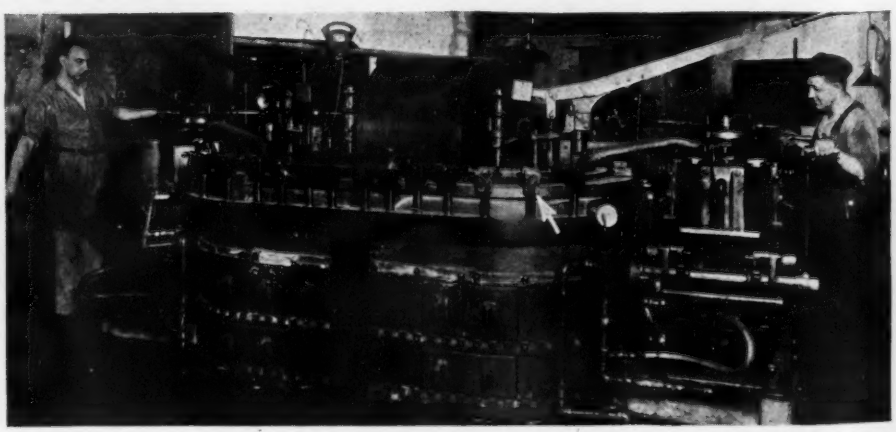
To heat this impregnating tank for packing-cup disks three 2,500-watt liquid-heating units were screwed into outer tank of oil to heat the inner tank, containing oils and waxes.—Guston Bacon Manufacturing Company, Kansas City.



In this retinning plant it is only necessary to insert the liquid-heating unit, hung in cabinet, in metal cleaning tank of caustic soda. Work formerly requiring eight hours now done in two.—Maryland Retinning Company, Baltimore.

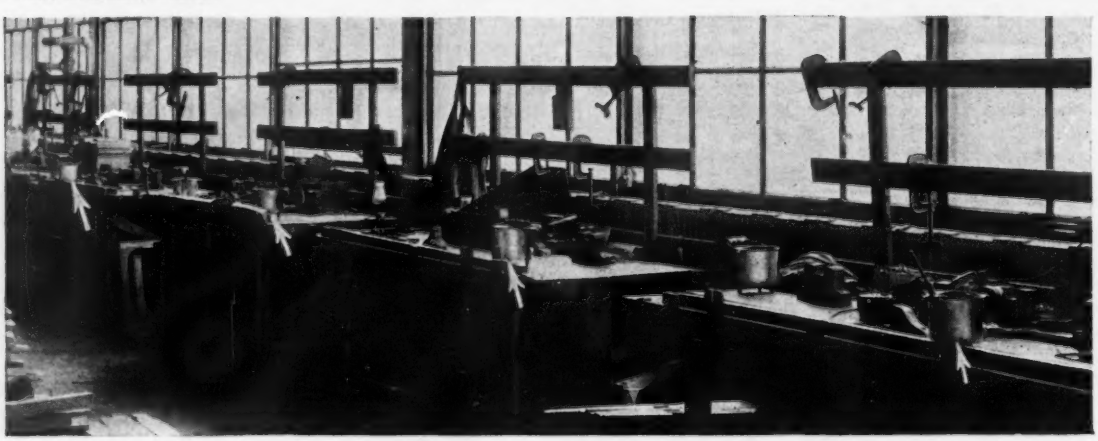


Twenty-four strip heaters distribute their heat over a wide area in this drying device.

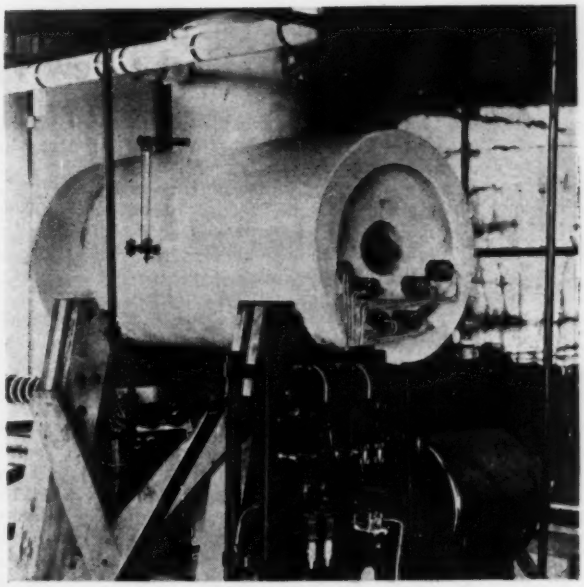


The woodworking plant below of an automobile manufacturer required glue-melting pots, hundreds of them, and found electric pots so satisfactory that it installed 350.—Willys-Overland, Toledo.

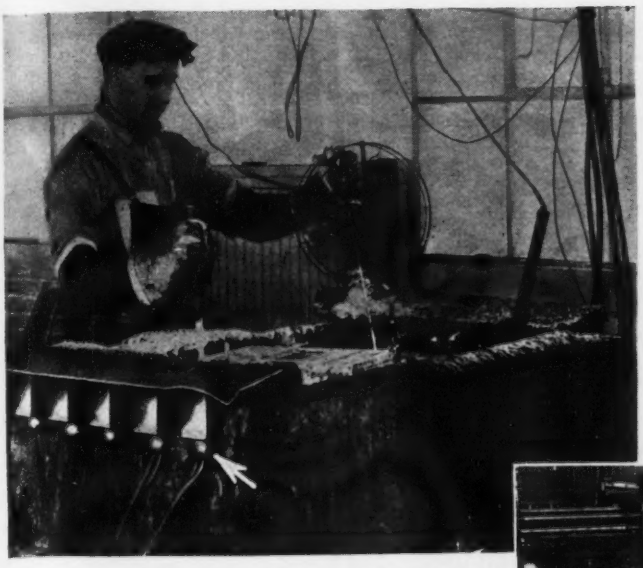
Every metropolitan newspaper plant, in a few years, will probably be using electric metal-melting units in all furnaces and pots. This Chicago *Daily News* 8-ton stereotype furnace is equipped with eighteen 10-kw. cast-in immersion units.



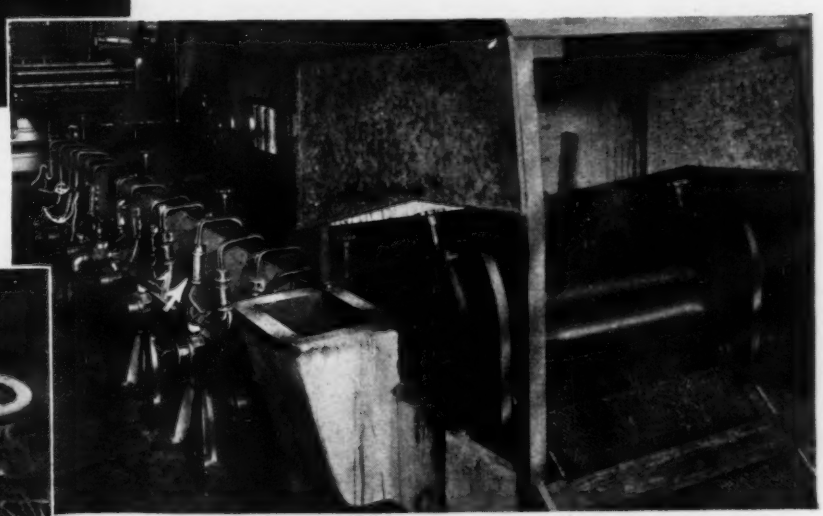
at Meets Variety nd Commercial Needs



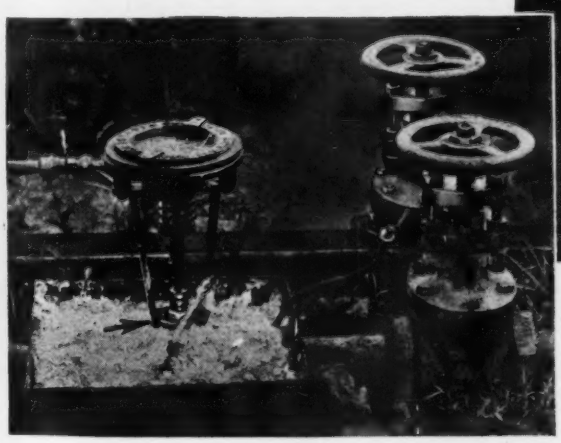
Supplies all steam needed in candy-plant cooking kettles, tank, etc. Equipped with twelve 5-kw. immersion units and semi-automatic control.—Robert Mackenzie Company, Cleveland.



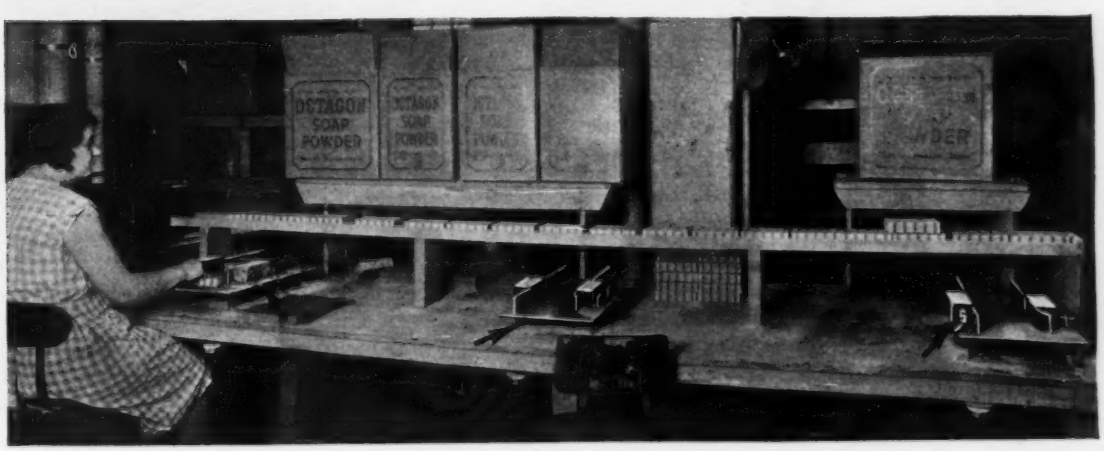
Hundreds of crude melting pots are used in otherwise modern plants. Every one can be easily converted to electric heat, as has this one, by ten 3-kw. cast-in immersion units having "ascaloy" sleeves on necks to resist acid.—Bush Manufacturing Company, Hartford.



To melt paraffin in this milk-bottle cap processing machine fourteen liquid-heating units are suspended over side of tank.—American Seal Kap Company, Natick, Mass.



Freezing of this automatic valve on a natural gas line is prevented by 500-watt sheath-wire heating units with heat insulation.—West Texas Utilities, Albany.



Three package sealers, each heated by two 150-watt cartridge units, one on each side, and one 300-watt unit imbedded in brass on bottom.—Colgate-Palmolive-Peet Company, Kansas City.

Just a Few Typical Accomplishments*

I—In 1926 the Commonwealth Edison Company sold the Dallas Brass & Copper Company a 1,500-watt, 220-volt metal-melting unit for direct immersion in a tinning pot. So satisfactory were the results that 216 units were subsequently sold. The total connected load has now reached 457 kw. and the estimated annual energy consumption 1,000,000 kw.-hr.

II—The Individual Drinking Cup Company, Inc., Easton, Pa., has installed in its various treater and cup machines a total of 306 kw. of connected heating load which averages an annual consumption of 800,000 kw.-hr.

III—The Wisconsin National Fibre Can Company uses liquid heating units to melt its paraffin and glue, totaling 135 kw. or 270,000 kw.-hr. a year.

IV—The sale of 10.5 kw. in small electric heating units and devices, and prospects for 81 kw. more—those were the results of the first day's use of the sample kits by the power salesmen of Tennessee Electric Power Company. The company ordered six of the senior sample kits. Eighteen calls on industrial plants were made. Following are the results:

Sold

21 500-watt sheath-wire units at $2.40 each.
1 100-watt soldering iron at $5.25.

Prospects

104 500-watt strip heaters at $1.70 each.
2 200-watt hotbed units at $13.50 each.
6 1,000-watt oil-immersion heaters at $9.50 each.
4 500-watt sheath-wire units at $2.40 each.
5 2,000-watt water-immersion heaters at $10.50 each.
1 5,000-watt steam generator.
1 Electric plating heater, approximately 5 kw.
1 Compound pot, 680 watts, at $22.

V—One New York office man of the G. E. Co. in the first two days, with his kit: (a) Interested a linoleum manufacturer in the purchase of a large number of strip heaters and thermostats; (b) persuaded a custom molder to specify electric heat in some molding presses that were being ordered; (c) sold a radio manufacturer some cartridge units and Calrod units and interested them in electric soldering irons; (d) showed the kit to an engineer in a chemical plant who became so interested that he called in the chief engineer and test engineer, and together they sat down and figured all the places in the plant where the "midgets" could be used.

VI—A mid-Western utility placed several copies of the G. E. catalog on electric heating units and devices in the hands of men connected with a prominent railroad company—men who could influence the purchase of these units. Inside of a week an order was received, entirely unsolicited and at no sales expense, for four 3-kw. air heaters and the necessary automatic control. These "midgets" will be used for heating automatic pump houses on the company's system. Net price, $180. Connected load, 12 kw.

*Furnished by General Electric Company.

far-sighted observation which appeared in the December 15, 1928, issue of the ELECTRICAL WORLD:

"Practically everybody who talks for publication about industrial electric heating has in mind large units of load, hundreds and thousands of kilowatts. But there is another class of heating load that comes in small, sometimes fractional, units. In this class are gluepots, small muffle furnaces, light welders and such bric-a-brac. The total of these usually unconsidered increments will run to a very high figure. It is estimated that the Detroit Edison system load would be increased 15 to 20 per cent if every small shop and factory in its service area that had use for a number of such devices were supplied with them. Here is a promising field for direct advertising and customer education. Any utility might enter it without any of the misgivings and qualifications that usually inhibit it from making the same kind of aggressive effort to take on the larger units."

In 1928 these appeared to be the words of "a voice crying in the wilderness." Today they are a prophecy come true.

Table II—Relation of Energy Revenue to Purchase Price

For some specific cases taken from General Electric booklet; given for example only and cannot be considered inflexible; prices, yearly consumption and revenue depend on unit used and extent of usage.

Unit	Price	Yearly Kw.-Hr.	Yearly Revenue*	Ratios of Revenue to Price	Comments
1 Cartridge	$2	250	$5	2½	A
1 Strip heater	1.50	500	10	6.7	A
2 Immersion (metal melting)	60	6,000	120	2	B
1 Immersion (liquid heater)	10	2,000	40	4	C
1 Glue melting pot (2 qt.)	18	450	9	½	D
1 Solder iron	6	150	3	½	E
1 Air heater (indust.)	40	3,000	60	1½	F
1 Electric steam generator (15 kw.)	500	15,000	300	0.6	G

*Based on 2-cent rate.

A — Usually installed in multiples

B — Nearly every utility territory has hundreds of plants that daily melt large quantities of soft metals or type metals.

C — In a single Wisconsin plant there is a 270,000-kw.-hr. annual consumption in liquid-heating units.

D — Plants requiring glue or compound pots usually install them by the hundreds.

E — Little sales resistance; thousands of units sold yearly.

F — Low cost, simplicity of installation, ease of shifting position and cleanliness make multiple selling easy.

G — In Cleveland alone there is more then 1,000 kw. in electric steam generators despite low gas rate.

Starting Currents Based on Service Demand

The utility is interested in motor-starting currents because if such currents are excessive the street mains must be reinforced heavily in order that good service be maintained. If the central station sets up restrictive rules regarding such starting currents, either the customer will be required to invest in higher-priced motors and starting equipment or he may invest in some other form of motive power and the business may be lost to the central station. For many years this situation was controlled by motor-starting rules, usually in the form of starting-current per horsepower, but more recently it has been recognized that such rules needed amendment in many instances.

It is obvious that a factory with thousands of horsepower in motors and an appropriate service connection should be allowed more leeway as regards the starting current of a given motor than a power service supplying a small elevator in a residence. The New York Edison Company, according to H. R. Searing, general superintendent of distribution operations, has met this situation by specifying starting currents in terms of service demand so that a large service can be practically free of starting current restrictions, while a customer with a small service is required to adopt such means as to keep the starting currents in line.

What Is Adequate House Wiring?

Eight industry associations answer this question in a co-operative standard of outlet location, wiring and switching layouts designed to provide the best modern service to the home and to develop potential equipment and supply markets.

INADEQUATE wiring for residences, long a stumbling block to complete home electrification, has joined the taboo list as a result of the co-operative work of eight industry organizations embodied in a recently issued booklet of eleven pages on "Adequacy Wiring Standards for Residence Buildings." The bodies sponsoring these standards are the Artistic Lighting Equipment Association, Association of Electragists, International, Illuminating Engineering Society, National Electric Light Association, National Electrical Manufacturers' Association, National Electrical Wholesalers' Association and Society for Electrical Development, Inc. Approval has been given by the International Association of Electrical Inspectors. The standards suggested cover residential and individual apartment wiring and seek to avoid the need of major changes in wiring capacity following new installation or improvement of old layouts. Installation methods or materials are not covered. The standards apply to the provision of adequate outlets, their nature, control and method of supplying service to them. Reasonable provision, it is asserted, has been anticipated for future developments in household equipment and service in both the determination of wire sizes and location of outlets and switching facilities. Economy has been sought by specifying a minimum number of branch circuits. The standards are suggested as applicable on a national scale without the detailed requirements sometimes in vogue on account of local conditions, and are specifically mentioned as not in conflict with Red Seal standards. Salient points in the standards agreed upon follow, with some paraphrasing and abridgment:

A—General recommendations for outlets and switching

A-1, Lighting Outlets—One or more ceiling outlets, with wall switch control, in every active room. Wall brackets as scheduled.

Rapid developments in the lighting art justify ceiling outlets, despite the existence of a school of thought which questions their vogue or value. Properly designed units do not produce negative reactions, but add a touch of completeness to the decorative scheme. Reliance on wall brackets as main light sources is difficult to achieve successfully, although recently urns and wall pockets have been made available for general lighting. Where such are used, balanced pairs in direct and semi-indirect types deliver at least moderately uniform light if located on both sides or at both ends of the room. All brackets should be shaded and group-switched.

Most outlets for decorative type brackets will give satisfaction if placed 5 ft. 6 in. above the finished floor. Utilitarian brackets, as in kitchen and bathroom, may normally be 5 ft. above the floor. Light sources beside shaving mirrors should be about 5 ft. 6 in. above the floor.

A-2, Closet Lights—One outlet for every closet 3 or more feet deep, or of at least 10 sq.ft. floor area, unless shelving or narrow depth prevents. Rigid fixtures only.

Pull chain fixtures are useful for small closets, wall or door switch control being advisable for larger spaces. A ceiling outlet in hall or adjoining room serves well in constricted situations.

A-3, Switch Control—One or more wall switches at each main entrance to every room, hall, passage or storage space for individual control of ceiling fixture, wall brackets and sometimes convenience outlets. Three-way or three-way and four-way switching of lighting outlets most frequently used at each regularly used entrance to every room or hall if such entrances are at least 12 ft. apart. Three-way switch control in main building for at least one lighting outlet for garage if detached, or other outbuilding. Three- and four-way control from head and foot of stairs for hall and stairway lighting outlets. Single switch control of wall brackets in any room at main entrance (except kitchen).

Basement stair lower light (with pilot lamp at top) controlled from top of stairway. Add switch for second control point if basement has outside entrance or separate areas for laundry, workbench or recreation. One switch at foot of stairs for third floor hall light.

For maximum convenience, use single switch control of convenience outlets, leaving one or more outlets unswitched for radio, clock, cleaners, etc. Avoid switch locations capable of causing mis-steps. Gang switches whenever feasible.

A-4, Convenience Outlets—Duplex type unless otherwise specified. Installed at or near baseboard unless other location is desirable.

Locate convenience outlets within 6 ft. of any point where portable lamp or other appliance may be used. Consider all possible furniture arrangements in locating such outlets.

B—Wiring standards for particular rooms

B-1, Entrances, Porches, Terraces, Patios, etc.—Front entrance, two wall outlets for lighting where architectural arrangement permits; otherwise one wall or ceiling outlet. Switch inside door. Outlet for illuminated house number separately switched.

Side and rear entrance, one ceiling or wall outlet for lighting, inside switch control.

Covered porches (for inclosed porches see Sec. *B-3*), one ceiling or wall outlet for lighting. Additional outlet for each 100 sq.ft. floor area. Inside switching.

One convenience outlet for decorative lighting at front entrance and one such outlet per 15 ft. of wall space on house side of porches, etc.

If top tread of steps is over 9 ft. from a point on the porch floor beneath the lighting outlet, additional outlets may be required to avoid shadows.

B-2, Halls, Passages, Stairways—One ceiling or wall lighting outlet on each floor for head and foot of stairs.

One additional outlet per 15 ft. of hallway may be desirable. Advise one convenience outlet for every 12 ft. of hall. Irregular-shaped corridors may require closer spacing of lighting outlets for uniform illumination. Consider telephone location, tables, mirrors, etc.

B–3, Living Room, Bedrooms, Reception Hall, Library, Den, Sun Room, Children's Playroom, Recreation Room, Inclosed Porches, etc.—One ceiling outlet per room for lighting. Provide at least two such outlets for areas in excess of 300 sq.ft. if length is more than 1.5 times width. Wall outlets should be symmetrically located, with switch control and related to furniture location. Convenience outlet spacing 6 to 12 ft. Provide one convenience outlet in top of mantel shelf when feasible, also radio ground and aerial connection at or near convenience outlet in living room and master bedroom.

Amusement rooms require high levels of lighting and usually two or three ceiling outlets. Free location of furniture should guide placement of convenience outlets. Even in short wall spaces convenience outlets are necessary for lamps on small tables, and other devices. If several living room outlets are controlled by a wall switch, portable lamp operation is facilitated. Use No. 14 A.W.G. copper wire for radio lead from attic and ground to water pipe.

B–4, Dining Room, Dinette, Breakfast Room or Nook—One ceiling outlet in each for lighting. Symmetrical wall outlets, control as in *B–3*. Convenience outlets, two per room for over 100 sq.ft. area; one minimum wall outlet per space for buffet; one floor outlet included in above two. For small rooms one wall outlet at table height usually suffices.

If multiple effect fixtures or cove lighting are used at least two switches are required and the necessary wiring provisions should be made in the plans. Floor outlet under table for cord to "table tap," or wall outlet near hostess' chair. Ceiling outlet should be directly above table center.

B-5, Kitchen, Kitchenette, Pantry—One centered ceiling outlet for lighting, with supplementary side wall or ceiling outlets for range, sink and other work areas. Provide convenience outlets at work table or cabinet and adjacent to every other work area for connection of refrigerator, dishwasher, sink, ironer, clock, fan, range and water heater.

Use a 100- or 150-watt lamp in kitchen unit. Place work area outlets 3 to 4 ft. above floor; clock outlet 7 ft. above floor; refrigerator and dishwasher outlets in or near baseboard. Control near-ceiling outlet for built-in fan by wall switch unless automatic.

B-6, Bathrooms and Lavatory—One wall outlet for lighting on each side of mirror and a ceiling outlet in bathrooms for sunlamp fixture, each with wall switch. Provide ceiling outlet for vapor-proof lighting fixture in separate shower, with outside switch, and one convenience outlet 3 to 4 ft. from floor and away from tub.

If winged mirror or special built-in lighting equipment is used, the selection should be made in advance to avoid alterations in wiring. In most cases provide for supplementary electric heating unit.

B–7, Laundry—One ceiling outlet over trays or tubs for lighting and one over probable location of ironer or board, controlling one by switch at entrance. Provide for washing machine one convenience outlet suspended on heavy, smooth rubber-covered cord 5.5 ft. above floor from an outlet box in the ceiling 3 ft. in front of the trays. Locate additional outlets for iron or ironer, water heater, hot plate and clothes drier.

Laundry lighting fixtures should be equipped with metal or glass shades and 100- or 150-watt bulbs. The "daylight blue" lamp aids in locating spots and stains. Equip wall outlet for ironing with pilot light.

B–8, Basement—One ceiling outlet at foot of stairs, one for lighting each inclosed space, in front of furnace and over workbench. One convenience outlet for tool service and extension cord.

B–9, Attic—One ceiling outlet at top of stairs or at entrance, with a ceiling outlet for lighting in each inclosed space. At least one convenience outlet in suitable location.

It is desirable to provide one circuit to an unfinished attic of sufficient capacity for subdivision. Convenience outlet for extension cord should be installed.

B–10, Garage—One ceiling outlet for lighting over car hood and one per car in multiple garages. Another for rear of car, and in multiple garages, one rear outlet in ceiling per two cars. One side wall lighting outlet for outside lighting, with three-way switch control from garage and main building. In one- and two-car garages one wall switch for all interior outlets. In three-car or larger garages control hood overhead lights by one switch, with second switch for rear ceiling outlets. Provide one convenience outlet on rear wall at each car stall, installed 4 ft. above floor.

B–11, Protective Lighting—Provide protective lighting outlets at rear outside corners of house under eaves, switching from master bedroom and point on first floor. In some cases shrubbery screening requires outlets under front eaves as well.

A wall switch in owner's bedroom to control one or more lights in any room or hall independently of normal switching may be desirable. Make "burglar" switch independent of others.

C—Branch circuits

Minimum size wire for branch circuits, No. 12 A.W.G.

Provide one circuit per 500 sq.ft. house floor area for lighting and convenience outlets except dining space, kitchen, pantry and laundry. Compute outside area and divide outlets as evenly as possible. Convenience outlets in dining, etc., space should be supplied by two additional circuits apart from lighting. Provide spare terminals for at least two circuits in distribution cabinet in addition to the lighting outlet, convenience and special circuits initially installed.

Increased cost of No. 12 wire over No. 14 is small for branch circuits, with resulting improved voltage regulation and faster operation of heating appliances. National Electrical Code waives the usual limit of twelve outlets per circuit if properly designed on area basis. It is recommended that outlets in any active room be served by two or more circuits to avoid complete interruption of service by blowing fuses or opening branch breakers.

D—Special purpose circuits and wiring

D–1, Range Circuit—Serve range by a circuit of 8,500 watts minimum capacity terminating near floor in heavy-duty polarized range receptacle.

D–2, Bathroom and Air Heater Wiring—Provide wiring of 2,500 watts minimum capacity to outlet box for built-in heater in each bathroom.

D–3, Other Heater Wiring—Provide capacity in service entrance and distribution cabinet for storage water heater in kitchen or basement and a hot plate in the laundry. Each device will probably rate between 2,000 and 5,000 watts.

D-4, Water Pump Motor Wiring—Carry two No. 12 A.W.G. wires minimum to motor control apparatus

or outlet box where no street main pressure service is used.

D–5, Oil Burner, Stoker or Air-Conditioning Circuit—For such equipment carry two No. 10 A.W.G. conductors to furnace room. Determine heavy-duty branch circuits in advance when possible, grouping heaters on one circuit as a rule.

E—Service entrance

Provide at least three No. 6 A.W.G. or equivalent conductors with protective equipment of corresponding rating. Follow National Electrical Code when increased capacity is required. The size of service entrance equipment is computed from the total wattages determined below:

For lighting, portable and fixed appliances, each under 1,500 watts rating, allow 2 watts per sq.ft. for the first 2,000 sq.ft. of floor area plus 1 watt per sq.ft. for excess area, plus 1,000 watts.

For fixed appliances of over 1,499 watts rating, total the wattage rating of the appliances installed or contemplated. Consult local inspection authority regarding diversity factor and necessary capacity of service entrance. Where water heating is not in operation while full range capacity is in use, wattage rating of heater need not be included in determining service entrance capacity.

F—Bells and buzzers

Provide outlet for bell-ringing transformer with push button wiring to serve bells of different tones, or bell and buzzer, usually in kitchen. Foot-operated push button in dining room for signaling kitchen, and in larger homes push buttons in principal rooms to call service staff.

G—Telephone service

One outlet with concealed wiring for telephone on each active floor. Consult telephone company for locations and consider use of intercommunicating systems in larger homes and in homes with detached buildings that may include living quarters.

H—Apartment house structures

In multiple dwellings and apartment structures the number and location of lighting and convenience outlets, the number of special purpose circuits applicable (usually only range and bathroom heater in large structures plus storage water heater in small multi-family dwellings) and the capacity of the feeder supplying the individual apartment or flat should be determined as for a single-family dwelling, except that only one circuit need be provided for dining quarters, pantry or kitchen (if no laundry space exists).

The capacity of the feeder or main supplying a group of apartments can be determined by applying the following demand factor to the total wattage rating of the individual apartments:

Number of Apartments	Factor
2	0.90
3	0.80
4-10	0.70
11-40	0.60
Over 40	0.50

Consult local inspection authority on above.

Large multiple dwelling or apartment structures require special engineering attention. Use of elevators, large heating and refrigeration plants, volume water heating, fire alarm, protection, emergency lighting and electrification of public spaces introduce requirements beyond the scope of this standard.

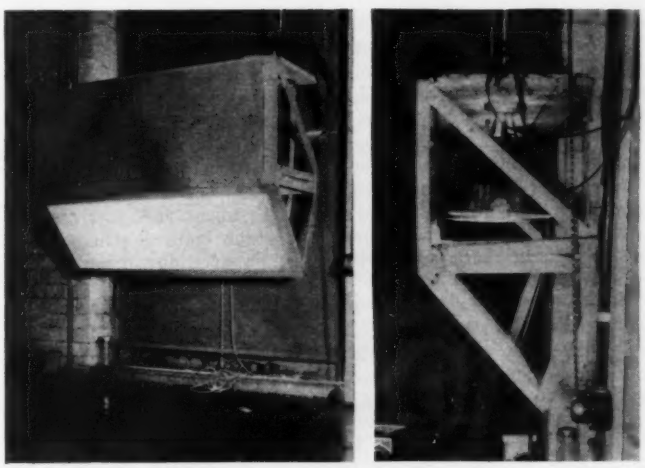
Glazed Kid Sorted Easier by Daylight Lamps

By J. W. GERARD

Manager Lighting Department,
Westinghouse Electric Supply Company, Philadelphia

Sorting into nine grades the glazed kid skins that go into shoes of the better quality requires keen vision on the part of the experts who do this work. Good lighting is an indispensable adjunct. Usually the grading is done on a 3-ft. bench under north-light windows. A common scheme is to provide two roller shades, one pulling down from the top, the other up from the bottom. The graders adjust these shades to admit about a 1-ft. beam of light at the right height for the sun elevation and brilliancy. In this way they are able to judge the color and degree of freedom from blemishes which differentiate the grades. Color judgment is especially difficult because the glazed surface is conducive to specular reflection.

But dull, cloudy days generally make the sorting impossible with natural light and in busy seasons this delay is costly. To avoid this economic loss one plant asked assistance in devising artificial lighting. Previous efforts had given unsatisfactory results. A preliminary trial of



Daylight fixture surpasses band of north light in leather grading

both indirect lighting and porcelain enameled steel reflectors also failed to give satisfaction. Success was finally attained by using 200-watt clear lamps in the frame shown in the accompanying illustration. Glare is controlled by a horizontal ground glass directly under the three lights and the daylight quality obtained by a daylight blue glass immediately under the ground glass. The effect of the oblique daylight was obtained by sloping a second piece of ground glass at about 45 deg. Two chains support the unit and serve to adjust its height and to raise it out of the way when desired.

With this arrangement the selecting of white and colored skins can be done better than with natural daylight.

READERS' FORUM

Year's Experience Justifies Instantaneous Reclosing

To the Editor of the ELECTRICAL WORLD:

Pertinent subjects in connection with rapid oil circuit breaker reclosure are discussed by Messers. Treat and Verwoert in the August 6 issue of ELECTRICAL WORLD. To supplement this discussion by manufacturers' representatives, there is a very limited amount of information from operating companies. It has been something over a year sinve J. T. Logan of the Georgia Power Company pioneered the first installation of instantaneous reclosing. The idea spread rapidly in various sections of the country, and there are now several operating companies approaching a year's operating experience. The comments herewith are a result of such experience by one company.

It is no exaggeration to say that results have been satisfactory and encouraging beyond expectation. Many suggested difficulties did not develop, at least not on any of the 60 installations which are in service to date in this company. The experience leads to the following observations:

(a) There are no voltage limitations to the field of instantaneous reclosing. It is just as reliable and satisfactory at the highest transmission voltage as at 2,300 volts. Furthermore, the percentage of lockouts is less on high-voltage lines.

(b) Instantaneous reclosing will restore service 80 to 90 per cent of the time that the line is not in permanent trouble.

(c) Every well-known American make of reclosing timing relay has been adapted satisfactorily to instantaneous reclosing. With some types of equipment and some control schemes one or more additional control wires are required for instantaneous reclosing.

(d) The use of standard reclosing timing relays is not essential for instantaneous reclosing. The standard timing relay will make two or three tests on a line, but at a continuously attended substation or power station only the first test has to be made automatically. The use of simple standard auxiliary relays to make an instantaneous test at an attended station (with the operator making the other tests if necessary) attains all the advantages of instantaneous reclosing at perhaps one-third the cost of the completely automatic two-shot or three-shot installation. To avoid the assembly of two or more simple relays for one-shot instantaneous reclosing some manufacturers are bringing out a new reclosing relay for this purpose. No timing device is required and the cost is approximately 25 per cent of the cost of a regular timing relay.

(e) Customers' synchronous motors or condensers will occasionally maintain an arc and cause the line to test bad on the instantaneous test, but the more usual effect of the synchronous load is to maintain the voltage enough to save the induction and lighting load, even with instantaneous under-voltage protection. That is, experience to date has indicated that synchronous load probably helps rather than hinders instantaneous reclosing, unless the synchronous load is a very great proportion of the total load on the feeder.

(f) Synchronous equipment with modern full automatic starting had caused no difficulty with instantaneous reclosing.

(g) It is difficult to reconcile operating experience with the contention of Messrs. Treat and Verwoert that synchronous motors will seldom resynchronize after instantaneous reclosure, unless the field is opened (until the machine gets nearly up to synchronous speed) and then reapplied. Motor-generators and synchronous condensers have been observed for years during system disturbances and they seldom shut down on long-continued phase faults on the transmission or distribution system. Above two-thirds speed at least some synchronous motors have an increase in torque with full field. We believe that new motors drop to such low speed during instantaneous reclosing. Rotary converters on mining load usually ride through instantaneous reclosures, to the surprise of everybody.

(h) Instantaneous reclosing greatly improves service to lighting customers. This is greatly appreciated by department stores, banks, telephone companies, hospitals, dentists, railway signal system, traffic signal systems, etc., where the momentary flicker of the lights is of little consequence, but where a brief period of darkness may be disastrous. As far as residence lighting is concerned, it is apparent that restoration of light at night in two-thirds of a second instead of fifteen to sixty seconds is quite a factor in creating good will toward the utility company.

(i) The effect of induction motors in sustaining voltage is not generally known, but, as suggested by Messrs. Treat and Verwoert, it is very important in analyzing relay operation on transmission lines.

(j) Treat and Verwoert give the limits of reclosing time as one-half to 1½ seconds. The latter figure presumably applies to 220-kv. breakers, but the writer knows of several new 2,300-volt feeder switches which reclose in 15 cycles, or one-fourth second. This does not include relay time, but the figures referred to above allow only one cycle for relay time.

(k) Equipment limitations have usually been found in power company station equipment, not in customers' utilization equipment. Inadequate control schemes, unsuspectedly slow breakers and generally inferior mechanical design of oil circuit breakers and accessories are the factors that prevent or delay the immediate installation of instantaneous reclosing to practically every feeder and tie line. Only rarely do customers have any difficulty with instantaneous reclosing, or have to make any changes in their equipment, other than the natural addition of time-delay under-voltage protection (where such equipment has not previously been installed).

(l) Considerable progress has been made in the last six months in establishing adequate control schemes and providing instantaneous reclosing on present breakers with a minimum amount of changes in the control wiring. In general, solenoid breakers are easier to arrange for instantaneous reclosing, since the inertia of a motor-driven mechanism is considerable and often interferes with relatching so that the breaker can reclose. Battery-operated solenoids have given less difficulty than rectifier-operated solenoids. There is always the possibility of difficulty with the performance of a.c. operated control devices, due to the voltage being lowered by closing in on a near-by short circuit.

(m) The article referred to also mentions that "faster closing circuit breakers will be available when there is a need for them." The writer would say that the need is already present. Practically all future breaker installations should be instantaneous reclosing. In fact, about the only exceptions are generator breakers and other equipment breakers provided with differential protection only. In general, all breakers supplying customers' load should reclose instantaneously unless tripped by hand or by differential relay.

(n) The primary argument originally advanced by the manufacturers and by some utility engineers against instantaneous reclosing was the supposed increase in breaker duty. The first installations were made on the basis that the heavy de-rating previously applied by manufacturers to the fifteen-second, 45-second, 60-second reclosing cycle had never been justified by experience, and that the manufacturers presumably were playing equally safe on de-rating for instantaneous reclosing. In any case it was thought that two reclosures at intervals of zero and 120 seconds were no more severe than three reclosures at intervals of fifteen seconds, 45 seconds and 60 seconds. If breakers gave trouble instantaneous overload relays could be added to lock out reclosure on heavy phase short circuits near the bus, and still get the advantage of instantaneous reclosing on all distant trouble. On 60 installations with several hundred instantaneous reclosures to date there has never been a case of a breaker throwing oil or showing overstress on an instantaneous reclosure and lockout relays have not yet been needed. Apparently the increase of duty on instantaneous reclosure is partly imaginary.

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Men of the Industry

A. H. Schoellkopf New Head Empire State Association

Alfred H. Schoellkopf, who has recently been elected president of the Empire State Gas and Electric Association (ELECTRICAL WORLD, October 15, page 520), is a member of the famous Schoellkopf family which for many years has had large interests in the electrical industry in the Niagara Falls region. He was educated at Phillips Academy at Andover, Mass., and the Massachusetts Institute of Technology. Before the organization of the Buffalo, Niagara &

Eastern Power Corporation, of which he is vice-president and general manager at the present time, he was vice-president and general manager of the Niagara Falls Power Company. He assumed his present executive duties with Buffalo, Niagara & Eastern in 1926. He is also vice-president of the Niagara Hudson Power Corporation. He has served in the course of his career on the directorate of the Buffalo, Niagara & Eastern Power Corporation, Buffalo General Electric Company, the Niagara Falls Power Company, the Niagara Gorge Railroad Company, Niagara Junction Railway Company, the Lockport & Newfane Power & Water Supply Company and a number of other industrial enterprises in that vicinity.

In addition to being active in civic enterprises in Buffalo, his native city, Mr. Schoellkopf has devoted considerable time to the Empire State Gas and Electric Association and other societies.

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R. J. MCCABE has been appointed New England manager of the Graybar Electric Company, succeeding the late Jerald F. Davis. Mr. McCabe has been on the staff of the company and its predecessor, the Western Electric Company, Inc., since 1909. He joined the organization at the Dallas, Tex., office and remained there until 1918, later being located at St. Louis and Kansas City. He went to Boston five years ago as manager of the supply department.

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LESLIE R. MOORE of Concord, Mass., has been appointed director of the gas, electric and water utilities division of the State Department of Public Utilities.

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S. H. MORTENSEN has been appointed engineer-in-charge of alternating-current design for the Allis-Chalmers Manufacturing Company, West Allis, Wis., to succeed the late R. B. Williamson.

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W. D. SHANNON, for many years Pacific Coast general superintendent for Stone & Webster Engineering Corporation, together with four former Stone & Webster associates, has organized the Shannon Engineering Company, with offices in Seattle. The company will engage in a general engineering practice in the industrial, hydraulic, structural, mechanical and electrical fields. Mr. Shannon is widely known on the Pacific Coast from his connection with some of the principal hydro developments, starting with the Caribou plant of the Great Western Power Company and culminating in the Rock Island project of Puget Sound Power & Light Company.

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California Edison Appoints New Officers

Harry J. Bauer has been named chairman of the board and George C. Ward president of the Southern California Edison Company, Ltd., to fill vacancies caused by the deaths of John B. Miller and Russell H. Ballard, chairman and president, respectively. Mr. Bauer, who has been attorney and a director of the company since 1917, was recently elected chairman of the board of directors of Claude Neon Electrical Products Corporation, Ltd., the office formerly occupied by Mr. Miller.

Mr. Ward, who has been senior vice-president for less than a year, has been intimately associated for many years with the management of the company. Leaving Phillips Andover Academy in 1882, he stepped immediately into railroad location and survey for the Raquet Lake Railroad in New York State. Until 1906 he was continuously connected with railroad and bridge building. During this period he became associated with Collis P. Huntington, and later Henry E. Huntington. It was at the instigation of the latter that Mr. Ward moved to California and entered into the work that was to make him an outstanding figure in the public utility industry, the task of developing the great hydroelectric potentialities of his adopted state. When the Big Creek-San Joaquin River project of the Southern California Edison Company was first conceived in 1912 he became actively interested in the

G. C. Ward

work and his guiding hand was apparent throughout. His outstanding achievement in connection with this enormous task was the successful carrying through to completion of the 13-mile Florence Lake tunnel through the solid granite of the high Sierras. In recognition of this achievement he was presented with a bronze medallion by the United States Chamber of Commerce in 1925.

Mr. Ward was vice-president of the Pacific Light & Power Corporation in 1917 when that utility was merged with the Southern California Edison Company. Then he became vice-president in charge of construction and operation of the Edison organization. In 1929 he was made executive vice-president, the position he occupied until the end of last year, when he was named senior vice-president.

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OBITUARY

HARRY ALEXANDER, president of Harry Alexander, Inc., electrical contractors, New York, ended his life October 18 at his home at Kings Point, Long Island, by shooting himself through the heart. He was 61 years of age. Mr. Alexander had had heart disease for several years. He was born in New York and by the time he was in his early twenties had established an electrical contracting business. He did electrical work in the old Siegel-Cooper store in New York, in the White House during the Roosevelt administration and in the "Little White House" in New Jersey during the Wilson administration.

New Equipment Available

Constant-Tension Regulator for an Electrical Drive

Constant-tension regulators developed to fill a need for an electrical drive for winding or unwinding material, a drive that would embody an automatic regulator, are announced by the Reliance Electric & Engineering Company, Cleveland, Ohio. These regulators, with their related equipment, are of such a character as to permit the winding or unwinding of material on a drum or core and maintaining a constant tension on the material to a degree of accuracy far in excess of what is commercially necessary, it is claimed.

Regulator armature has two windings, a torque winding connected in series with the motor driving the reel and an opposing or spring winding, receiving its power from the main line. The tension regulator, which automatically keeps the current at the desired value, is essentially a double motor turning a rheostat. One-half of the regulator, the spring winding, sets up a torque in one direction and the other half, the torque winding, sets up an opposite torque. When the current is of such a value as to establish a torque equal and opposite to the spring winding no movement of the regulator results.

Some of the advantages claimed are: A constant tension is maintained under all conditions, the amount of tension is easily adjusted, trouble experienced with slipping clutches is eliminated, etc.

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Application for Electric Motor for Operating a Chuck

A new application for an electric motor for operating a chuck has been announced by the Cushman Chuck Company, Hartford, Conn. This chuck provides an increased grip for holding work on multiple-tooled turning machines. It has a wide field of application and may be used on any modern engine or turret lathe that is adaptable to pneumatic or hydraulically operated chucks.

A distinct advantage gained by the use of this equipment is that work may be set up in the machine and released very rapidly after machining, thereby reducing the idle time. Power consumption is low because the motor operates only with closing or releasing the chuck.

The motor and control have been developed by Westinghouse engineers. The motor is of the high-torque, squirrel-cage induction type, is built into the chuck-operating unit and is dynamically balanced to reduce vibration when the lathe spindle is turning at high speeds. Current is supplied to the motor through a system of collector rings carefully designed to give trouble-free operation at high speeds. When operating the motor is allowed to attain full speed before it picks up the load and therefore delivers a hammer blow to a nut, causing it to release even when seized by stalling as in the case when the chuck grips a piece of work.

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Gaseous Tube Lighting Without Internal Electrodes

Gaseous-discharge light sources have been developed by the Luminous Tube Lighting Corporation, Seattle, Wash., under the name of "Lulite," which depart from the usual construction in having no metal or electrodes inside the gas space. Furthermore, the manufacturer claims that the power factor is 100 per cent, that the light does not waver, that long life without attention is obtained (several thousand hours or even several years).

The tubes, which may be filled with carbon dioxide, neon, mercury, helium, etc., are made up of a series of short parallel metal-coated glass tubes which are lacquered. A condenser effect is produced between the metal coatings on the outside of the tubes and the film of gas on the inside. The glass constitutes the dielectric. Because of the relatively short distance between the condenser plates, the intermediate gas is broken down by a relatively low potential and glows according to its characteristic color under electron discharge conditions.

The CO_2 tubes are said to be particularly suitable for windowless factories or buildings, mines, eye comfort in close visual work, color matching of dyes, paints, textiles, grading wheat, tobacco, cotton, woolens, etc., and for lighting art galleries. Built-in units are being made for stores, show windows, show cases, etc.

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PHOTOELECTRIC RELAYS applicable to installations where virtually complete interception of the light beam is effected, since changes of light intensity of at least 50 per cent are necessary for successful operation, are announced by the General Electric Company. The relay, designated as the CR7505-K1, consists of a phototube, a pliotron amplifying tube, a sensitive relay, an adjustable potentiometer and associated apparatus, all mounted on a steel base. It is used to control a circuit in response to an increase or decrease in the amount of light falling on the phototube.

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Neon Glow Indicates Burned-Out Lamp

"Mazda" miniature lamps which continue to glow after failure are announced by the Westinghouse Electric & Manufacturing Company. Made in an F-6½ bulb with the regular miniature screw base, the detector lamp is designed for series burning in strings of eight sockets each and on 100 25-volt circuits, either a.c. or d.c.

The detector feature of this new "Mazda" lamp is based on a neon glow, designed as an improvement on the old style. Each lamp contains a small quantity of neon gas. When a burnout occurs the full voltage is impressed across the terminals of the lamp, resulting in the characteristic neon glow. Whether operated on alternating or direct current, a detector lamp continues to glow after burnout. On a.c. circuits the entire filament and lead-wire support of a burned-out lamp glows, while on d.c. circuits only one side of the filament and its lead wire glows.

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A WELDING HEAD for automatically welding with heavily coated electrode is announced by the General Electric Company. The new equipment, which consists essentially of a heavy-duty automatic head with a device for conducting the current to the electrode, will have a capacity for heavily coated electrode up to ⅛ in. in diameter and is rated up to 600 amp. Modification of its design can be made for larger electrode and heavier welding currents.

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INDUCTION TYPE PRESSURE GOVERNORS for the automatic control of motor-driven pumps which are extremely sensitive to minute variations in average pressure yet are unaffected by pressure surges are announced by the Consolidated Electric Company, St. Paul, Minn. They operate on the induction principle and, except for the mercury pilot switch, have no electrical contacts.

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"YARWAY GUN-PAKT" EXPANSION JOINTS which may be packed when the steam line is under full pressure have been announced by the Yarnall-Waring Company, Chestnut Hill, Philadelphia, Pa. The new cast-steel Yarway "gun-pakt" gland is similar to glands using commercial coil packing, except that the "gun-pakt" gland is stationary, being bolted securely against the end of shell of expansion joint.